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Proposed
FY98-00
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PROPOSED CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1998 - 2000

December 30, 1996

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December 24, 1996

Andrew Papastergion, Chairman
MWRA Advisory Board
11 Beacon Street
Boston, MA 02108

Dear Chairman Papastergion and Advisory Board Members:

This letter transmits to the Advisory Board for review and comment MWRA's Proposed Capital Improvement Program (CIP) for fiscal years 1998 to 2000, in accordance with MWRA's Enabling Act.

The proposed CIP forecasts annual capital spending for FY98 through FY07 and beyond, and MWRA uses the financial information it provides in the formulation of rates and charges to user communities. Proposed CIP capital projects support MWRA's mission to provide reliable, cost-effective, high quality water and sewer services.

The Proposed FY98-00 CIP includes 82 projects comprised of more than 760 project phases. It provides a three-year budget of $1.5 billion and a ten-year budget $2.9 billion for capital improvements to the wastewater and waterworks systems.

The Executive Summary presents an overview of anticipated capital spending, anticipated grant revenue and capital financing requirements needed to support the capital program, and the impact of operating new facilities on the current expense budget. The CIP *Supplement*, included in the back of the Proposed CIP document, presents detailed expenditure forecasts by project phase and fiscal year.

Highlights of the FY98-00 Capital Improvement Program

- **Commitment to Achieving Long Term MWRA Policy and Program Goals.** While the proposed CIP includes several new capital initiatives, there are no significant shifts in policy direction or in the projected flow and volume of capital spending over the next ten years.

- **Commitment to Improving Boston Harbor Water Quality by Completing the Boston Harbor Project.** MWRA has expended more than $2.7 billion on the Boston Harbor Project to date, with FY94 marking the peak year of construction spending. Another $430 million is required from FY98 through FY01 to successfully complete and begin full operation of all components of the project. Completion of BHP's final major milestone, the last secondary treatment battery, is scheduled for December 1999 (FY2000).

- **Commitment to Delivering Safe and Healthful Drinking Water.**
  The Proposed FY98-00 CIP marks the initial years of shifting MWRA capital resources from the construction of primary and secondary wastewater treatment facilities to the design and construction of capital facilities that supply, transmit, and protect drinking water. This includes construction of the MetroWest Tunnel, Norumbega and other covered storage facilities, and the Walnut Hill Water Treatment Plant. In FY99, Waterworks expenditures will surpass Wastewater expenditures as a percentage of total MWRA capital spending.

- **Commitment to Rehabilitating and Maintaining Existing Assets.**
  MWRA has invested more than $3 billion to date in the construction of new facilities and the rehabilitation of existing systems. As our organizational focus shifts from construction of new facilities to operational efficiency, reinvestment in and maintenance of existing assets becomes an ever increasing priority. Pipeline, pump station, and other facilities improvements comprise 25% of the ten year capital budget.

  Waterworks pipeline projects included in the proposed CIP are projected to provide more than 37 miles of new and rehabilitated pipe to the waterworks system between FY98 and FY02. Wastewater interception and pumping projects are projected to add 3.2 miles of newly constructed interceptors and 15.5 miles of rehabilitated interceptors between FY98 and FY02.

- **Commitment to Limiting Storm Induced Overflows and Eliminating CSO discharges.**
  Increases in the CSO budget, based on revised estimates for hazardous materials removal and tunnel construction, reflect progress made in site selection and design for long-term CSO control plan projects. The portfolio of local sewer improvement projects included in the CSO System Optimization Program is scheduled for completion in FY00.

FY98-07 Summary

The proposed CIP includes a ten-year capital budget (FY98-07) of $2.878 billion, compared to $3.085 in the FY97-99 CIP for FY97-06. The decrease in the ten-year budget is primarily the result of one fewer year of Boston Harbor Project spending (the FY97 BHP budget is $241.5 million), offset by increases described below and $50.5 million in projected spending for FY07.

Total project costs, which include all prior expenditures through the end of FY96, increase $138.1 million compared to the FY97-99 CIP. This change is primarily comprised of increases in the budgets for CSOs ($72 million), BHP ($38.5 million), the Walnut Hill Water Treatment Plant ($12 million), and new projects ($20.2 million).

Projected Annual Spending for Fiscal Years 98-00

The Proposed FY98-00 CIP provides for an estimated $1.46 billion in capital spending for fiscal year 1998 through fiscal year 2000. This compares to $1.25 billion for the same fiscal years in the FY97-99 CIP. Annual capital spending increases during FY98-00 and decreases during FY01-03 primarily as a result of increases in the BHP and CSO budgets, and shifts in projected spending for the MetroWest Tunnel. The largest increase is $114.8 million (29%) in FY99. The Authority's ability to use rate stabilization funds to smooth rate increases means these shifts will have relatively little impact on projected rates over the next three years.

Waterworks annual spending increases $74 million during FY98-00 and decreases $64 million during FY01-03 primarily as a result of shifts in MetroWest Tunnel spending. Wastewater spending increases $61 million during FY98-00 as result of increases in the CSO budget. BHP spending increases $40 million during FY98-00 as a result of increases in the scope of the Ancillary Modifications contracts and the extension of one-year options for transportation contracts.

The Future

MWRA remains committed to its rates management strategy and its mission to provide high quality, cost-effective water and sewer service to its customers. To this end, we continue to seek new cost saving measures to assure that every capital project is completed in the most cost-effective manner, and will continue to work to improve project cost and schedule accountability.

We look forward to working with you during the Advisory Board's budget review process, and welcome your input as we develop the final FY98-00 CIP.

Sincerely,

Douglas B. MacDonald

Douglas B. MacDonald
Executive Director

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EXECUTIVE SUMMARY

Executive Summary

What is the Massachusetts Water Resources Authority?

The Massachusetts Water Resources Authority (MWRA) is a quasi-public agency created by the Commonwealth of Massachusetts in 1985, with the responsibility for providing water service to 47 cities and towns, and collection and treatment of sewerage from 43 cities and towns. MWRA operates and maintains waterworks and wastewater facilities located from the Quabbin Reservoir in western Massachusetts to Boston Harbor. (See service area map on page 22.)

Mission

MWRA's mission is to provide reliable, cost-effective, high quality water and sewer services that protect public health, promote environmental stewardship, maintain customer confidence, and support a prosperous economy.

Wastewater and Waterworks Systems History

MWRA inherited the wastewater and waterworks systems from the Metropolitan District Commission, an agency that did not possess the institutional and financial ability to maintain reliable service and meet environmental regulatory requirements. MWRA inherited a backlog of scores of projects, at a projected cost of more than $1 billion, that addressed only immediate service delivery problems. Since 1985, the Authority has made significant progress in addressing these problems. In addition, MWRA assumed the formidable task of eliminating wastewater pollution in Boston Harbor by constructing a new primary and secondary treatment plant on Deer Island. MWRA is also now moving ahead on several major waterworks distribution and treatment projects designed to ensure that it will continue to reliably transport water from the Quabbin and Wachusett Reservoirs to the distribution reservoirs in western metropolitan Boston, and that this water will be treated and stored to maintain its high quality and meet federal safe drinking water requirements. These projects include the MetroWest Tunnel, the Walnut Hill Water Treatment Plant, and construction of several covered storage distribution facilities.

The Capital Improvement Program

This Capital Improvement Program (CIP) presents plans for capital investment in 82 projects at an estimated cost of $1.5 billion for FY98-00.[1]

Highlights of the FY98-00 Proposed Capital Improvement Program

- The proposed CIP presents no significant shifts in planned capital expenditures or priorities from the FY97-99 CIP. The Boston Harbor Project's last major milestone, completion of the last secondary treatment battery, is scheduled for completion in December 1999 (FY2000).
- The FY98-00 period includes the first years of significant construction for the major waterworks capital projects designed to improve supply, transmission, and protection of drinking water. In FY99, Waterworks capital spending will exceed BHP project spending.
- The proposed budget includes $450.6 million for Waterworks distribution and pumping projects and $412.5 million for Wastewater interception and pumping projects.
- The proposed CIP includes $20.2 million for new projects, including $16.7 million for design and construction of an on-site sodium hypochlorite plant at Deer Island.

MWRA has already undertaken substantial work on many of the projects in the CIP, as authorized in prior capital budgets, and anticipates that all projects included in this document will begin by FY06. Estimated expenditures on all projects from the Authority's inception in 1985 through the end of FY97 are $3.5 billion. The total projected capital investment for the ten-year period FY98-07 is $2.9 billion.

For the twenty one-year period 1985-2007, MWRA is projected to spend $6.4 billion, nearly 70 percent of which will support improved wastewater treatment and interceptor systems.

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[1] The Proposed FY98-00 CIP budget is stated in December 1997 dollars, including estimates for future project phases (unawarded contracts) which have been inflated by 1.6 percent to bring their value from the December 1996 benchmark to a December 1997 benchmark. The FY97-99 CIP budget estimated inflation December 1995 to December 1996 at 2.4 percent. Budget estimates in this CIP document do not include future inflation.

The table below presents projected spending by fiscal year by capital program. Boston Harbor Project and Wastewater System Improvements comprise the total Wastewater capital program.

PROJECTED EXPENDITURES BY PROGRAM
(in millions)

Capital Program	**FY 98**	**FY 99**	**FY 00**	**FY 98-00 Total**	**FY 01-2007**	**10-Year Total**
Boston Harbor Project	$188.2	$169.9	$63.4	$421.5	$9.0	$430.5
Wastewater System Improvements	$69.2	$77.4	$112.9	$259.5	$407.5	$667.0
Waterworks System Improvements	$179.8	$205.1	$234.2	$619.1	$852.8	$1,471.9
Business and Operations Support	$8.2	$3.8	$6.5	$18.5	$7.6	$26.2
Contingency	$45.5	$49.4	$44.8	$139.7	$142.6	$282.3
TOTAL	**$490.9**	**$505.6**	**$461.8**	**$1,458.3**	**$1,419.5**	**$2,877.9**

Significant Accomplishments

Since its inception in 1985, MWRA has completed 88 capital projects. Among its major accomplishments, the Authority has:

Boston Harbor Project

- Through November 1996, completed 87 percent of construction physical progress for the Boston Harbor Project.
- Through September 19, 1996, completed mining of 9.5 miles of the Effluent Outfall Tunnel.
- Completed 32 of 55 diffuser riser adits through November 1996.
- On November 4, 1995, completed the 4.8 mile Inter-Island Tunnel bore from Deer Island to Nut Island. Concrete lining operations began in January 1996. A total of 10,248 linear feet (1.94 miles), or 41 percent of the tunnel has been lined through November 1996.

- In February 1996, completed the South System Pump Station and functional testing of the eight pumps. The contractor is performing preventive maintenance on the pumps until the Inter-Island Tunnel is completed.

- On December 8, 1995, declared the Residuals Treatment Facility - Phase I (Module No. 2) substantially complete.

- In January 1995, began primary treatment of wastewater in the first two batteries of the new Deer Island Treatment Plant.

- In March 1993, began initial distribution of fertilizer pellets produced at the residuals management facility, and in FY95 substantially completed fast-track equipment installation for plant expansion.

- In December 1991, began operation of the Fore River residuals management facility, ceasing the discharge of wastewater sludge and scum into Boston Harbor.

Wastewater System Improvement Projects

- In September 1996, substantially completed all construction contracts for the New Neponset Valley Relief Sewer project.

- In June 1996, awarded the first design contract (Upgrade Existing Facilities) for the CSO Control Program.

- In March 1996, substantially repaired the breach to existing Outfall 002 at Deer Island.

- In 1995, substantially completed rehabilitation of the Alewife Brook Parkway Pump Station and the Cottage Farm CSO Ventilation System.

- In 1994, adopted a revised conceptual Combined Sewer Overflow (CSO) plan, which will save ratepayers several hundred million dollars compared to an earlier plan to address the problem.

- In October 1992, completed the Clinton Wastewater Treatment Plant.

Waterworks System Improvement Projects

- On May 22, 1996, awarded the construction contract for the middle segment of the MetroWest Tunnel project.

- In July 1995, completed installation of central monitoring controls for the Reservoir Road Pump Station.

- In 1995, awarded a contract to reconstruct three pumping stations (Lexington St., Newton St., and Spot Pond) with a combined pumping capacity of 85 million gallons per day.

- In October 1994, completed construction of two major transmission mains (18 miles) and in October 1995 began construction of a third main (three miles) which serve the Northern High System.

- In December 1994, selected the Walnut Hill site as the preferred location for a new water treatment facility.

- In 1994, substantially completed replacement of community water revenue meters at 130 sites.

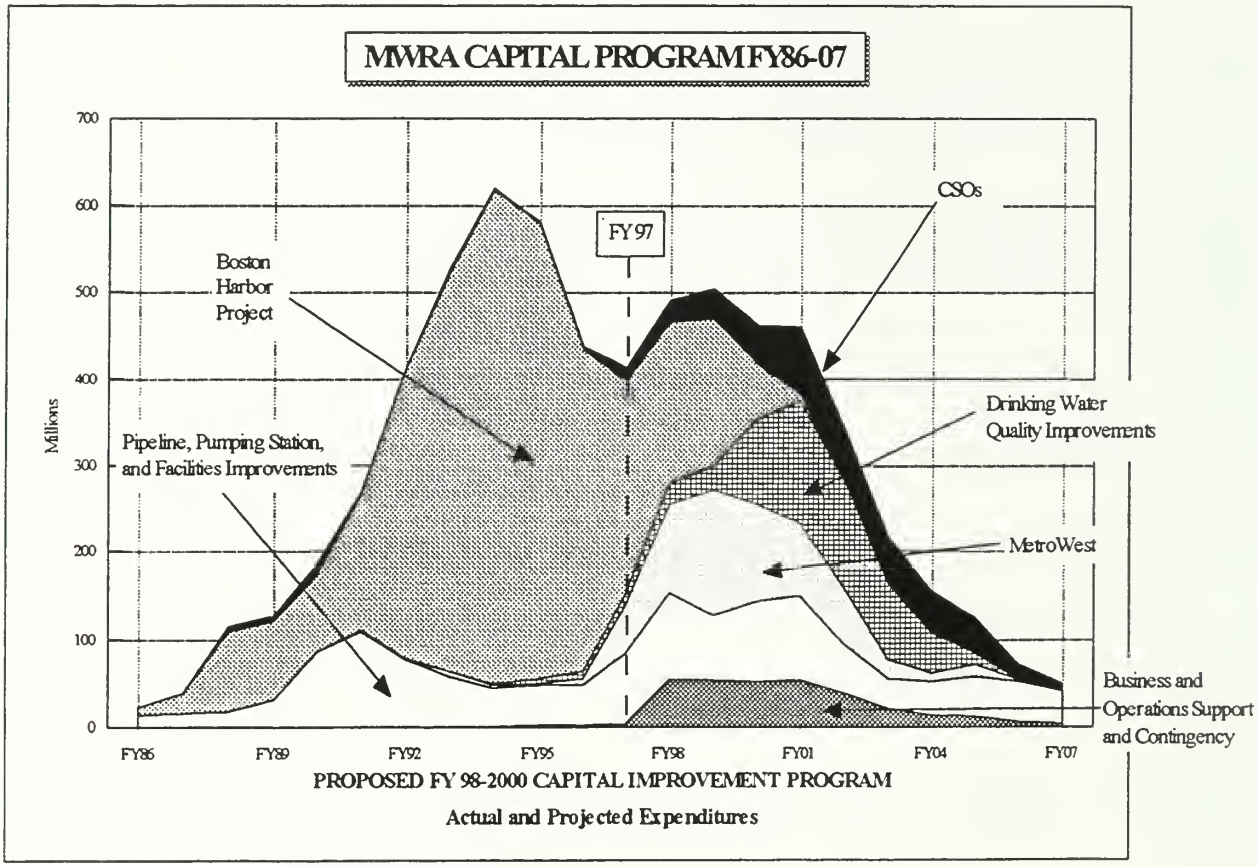
- In 1993, upgraded and replaced chlorination facilities at Weston Reservoir and in 1989 at Norumbega Reservoir.

- In 1993, completed a corrosion study which identified pipes with the most serious corrosion problems and completed the draft Waterworks 20-Year Master Plan.

A listing of completed MWRA capital projects appears in Appendix A of this document.

MWRA Actual and Projected Capital Spending

The graph below illustrates actual capital spending from FY86 through FY96 and projected spending from FY97 through FY07. Peak spending for the Boston Harbor Project occurred in FY94. Peak spending for the MetroWest Tunnel is expected to occur in FY99, and for the Walnut Hill Water Treatment Plant in FY01.

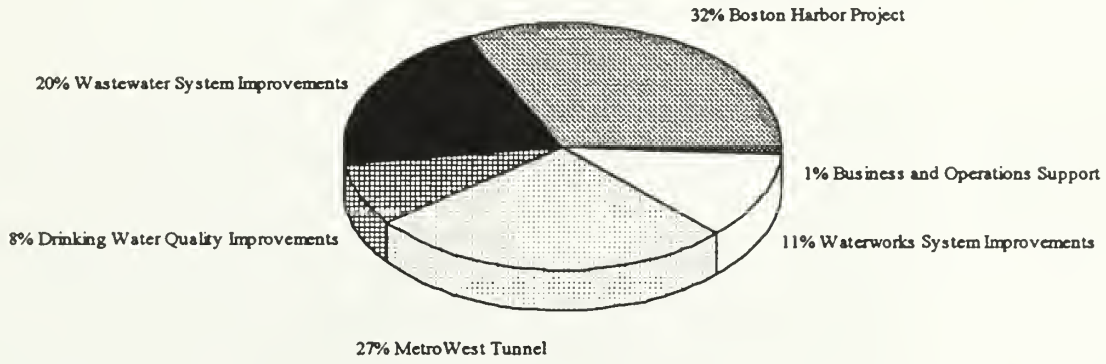

MWRA CAPITAL PROGRAM FY86-07

PROPOSED FY 98-2000 CAPITAL IMPROVEMENT PROGRAM

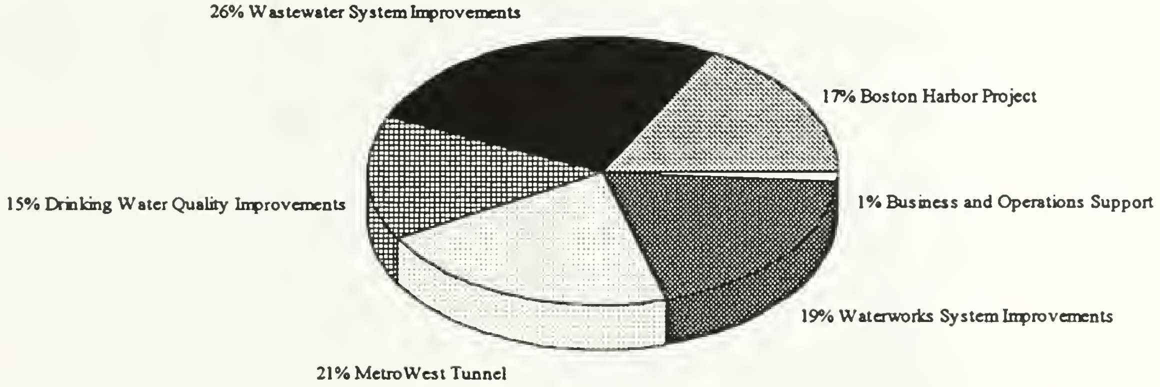
Actual and Projected Expenditures

The graphs below depict MWRA's three-year and ten-year spending plans, and illustrate the shift in capital spending from the Boston Harbor Project to Waterworks projects.

Percentage of Projected 3-Year Capital Spending
FY98-00



Percentage of Projected 10-Year Capital Spending
FY98-FY07



WASTEWATER SYSTEM IMPROVEMENTS

Overview

Wastewater system improvement projects continue modernization of the wastewater collection system to meet current and future demand, and to dramatically improve the level of wastewater treatment.

Program Categories

MWRA divides Wastewater System Improvements into five categories: Interception and Pumping, Treatment, Residuals Management, Combined Sewer Overflows (CSOs), and Other Projects.

Interception and Pumping

The Interception and Pumping category includes 16 projects to improve the sewage collection and pumping system at an estimated cost of $412.5 million. MWRA is constructing or plans to construct five new relief and replacement interceptor sewers in the southern collection system at a cost of $290.2 million. These interceptor projects include installation of approximately 56 miles of pipeline, gravity sewers, and siphons; construction of three new pump stations; and construction of a 2.9 mile deep rock tunnel. The New Neponset Valley Relief Sewer project achieved substantial completion in September 1996, and the majority of the Framingham Extension Relief Sewer project, is scheduled for completion in 2000. The Authority expects to complete the Wellesley Extension Sewer Replacement Project in 2000, and Braintree-Weymouth Relief Facilities in 2002.

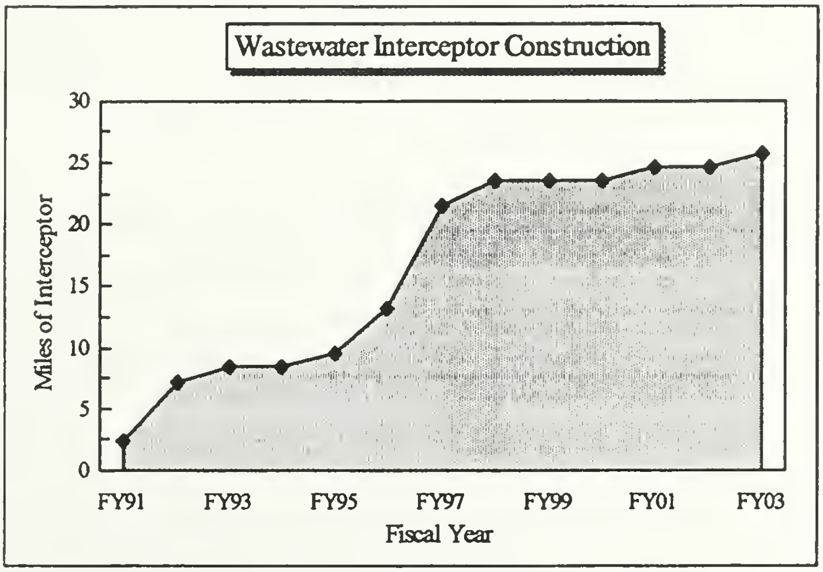
The Interception and Pumping category also includes three pump station rehabilitation projects in Quincy. The existing stations are from 50 to 85 years old, and cannot handle existing sewage flows or need equipment rehabilitation. MWRA will complete the Quincy Pump Facilities Project in 2001.

In the northern collection system, MWRA plans to complete rehabilitation of the North Metropolitan Trunk Sewer in 1998 at a cost of $13.5 million. In addition, this budget includes $4.2 million for planning, design, and construction of the Cummingsville Replacement Sewer to address sewerage surcharging and overflow problems. MWRA expects to complete the Cummingsville project in 2002.

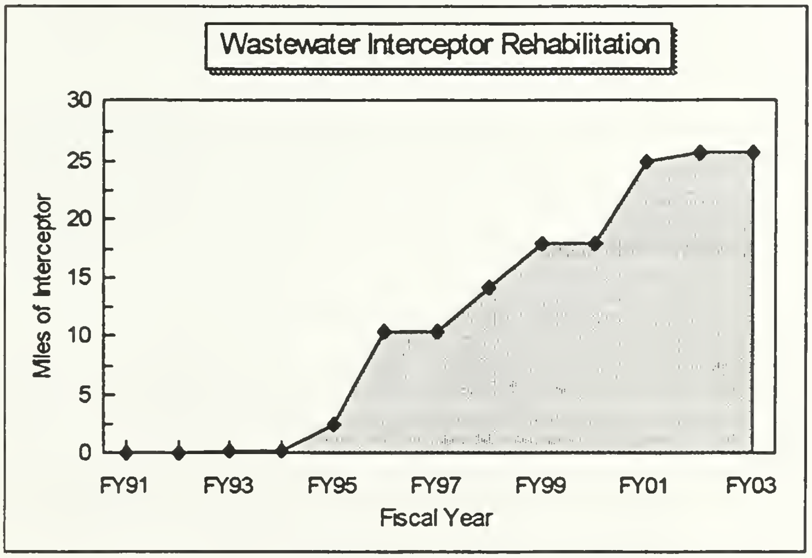
Many siphon chambers and diversion structures in the wastewater system are inaccessible for maintenance, resulting in debris accumulation, poor flow conditions, and serious odor problems. The CIP includes a project to inspect all structures and identify methods to improve accessibility and the transport of flows. The Authority plans to complete facilities planning for this project in 1997.

The two graphs below present summaries of newly constructed and rehabilitated interceptors completed or scheduled for completion. Miles of interceptor represented through FY96 reflects cumulative completed miles; FY97 through FY03 reflects cumulative miles projected for completion based on the individual project schedules included in this CIP.

Actual and Projected Miles of Newly Constructed Interceptor



Actual and Projected Miles of Rehabilitated Interceptor



The proposed CIP includes two new Interception and Pumping projects at a cost of $815,000:

- West Roxbury Tunnel, a $215,000 study projected for completion in FY98, will assess the condition of the West Roxbury Tunnel sewer and develop recommendations for rehabilitation.
- Wastewater Central Monitoring, a $600,000 study projected for completion in FY99, will assess the feasibility of implementing an automated system that will allow MWRA staff to centrally monitor and operate the Wastewater Transport system.

Wastewater Treatment

The Treatment category includes the Authority's most significant wastewater project, the federal court mandated Boston Harbor Project (BHP). The primary component of the BHP is the new Deer Island Primary and Secondary Treatment Plant. When complete the new plant will have the capacity to process 1.27 billion gallons of wastewater per day (bgd) for primary treatment and 1.08 bgd for secondary treatment. Construction of the plant and related facilities is an 11-year endeavor and will cost approximately $3.6 billion including off-island residuals management facilities. The new Deer Island plant will be the second largest treatment plant in the United States and will serve MWRA service communities in the Metropolitan Boston region. A more detailed discussion of the plant is found in the narrative for CIP project #1204, Deer Island Primary and Secondary Facilities. The new plant replaces two existing primary plants: the Deer Island plant, built in 1968, and the Nut Island plant, built in 1952. The first phase of the new plant began operation in January 1995.

The Wastewater Treatment category also includes eight projects to rehabilitate existing facilities. One project, begun in 1987, consists of improvements to the three Deer Island headworks facilities. Remote Headworks Rehabilitation is projected for completion in 1997 at a total cost of $3.5 million.

The CIP includes six new treatment projects at a cost of $19.3 million:

- On-Site Sodium Hypochlorite Plant, a $16.7 million project scheduled for completion in FY99, will generate sodium hypochlorite on Deer Island.
- Deer Island As Needed Design/CS/RI will provide DITP staff with as needed design and resident inspection services.

- Deer Island Construction Service Contracts (CSCs) will support $1.5 million in as needed construction services to ensure a safe and efficient transition to full operation of the Deer Island plant.

- Deer Island Coastal Protection will restore Deer Island's shoreline from the effects of construction or erosion in the event it is required.

- Deer Island Plant-Wide Systems, a $250,000 project scheduled for completion in FY99, will implement a plant-wide computerized system to allow plant engineers to more efficiently facilitate the repair and maintenance of mechanical systems.

- Clinton Landfill Liner Repair, a $400,000 project scheduled for completion in FY98, will repair the sludge landfill liner of Basin 1 at the Clinton Treatment Plant, if required by DEP.

Residuals Management

The new Deer Island Treatment Plant requires the addition of residuals management facilities, on and off Deer Island, to effectively treat, reuse, and dispose of treatment by-products. Total off-island residuals management capital cost estimates are $154.5 million, including $98.4 million for the construction of the sludge pelletizing plant at the Fore River Staging Area in Quincy. Operation of the plant began in December 1991. This proposed budget includes $56.1 million for plant expansion to accommodate increased sludge volume generated by the new secondary treatment facilities at the Deer Island Treatment Plant.

Combined Sewer Overflows

The Wastewater System Improvements program also includes a region-wide facilities plan and portfolio of construction projects to provide management and control solutions for combined sewer overflows (CSOs). Planning, design, and construction of region-wide CSO control facilities are estimated to cost $452.7 million. This is a reduction of more than $508 million from the $961 million included in the FY95-97 CIP, and a reduction of $743 million from MWRA's initial CSO Master Plan. The new plan differs markedly from the Authority's 1990 CSO recommendation to construct a series of holding tunnels. The new plan, calls for the construction of 24 local CSO controls to address the different water quality needs of the various receiving water segments in Boston Harbor and its tributaries.

Other Wastewater Projects

The only project in this category, the Infiltration/Inflow (I/I) Local Financial Assistance Program, provides financial incentives to communities to rehabilitate their collection systems to structurally reduce I/I flows. The FY98-00 budget for the I/I program is $15.9 million.

WATERWORKS SYSTEM IMPROVEMENTS

Overview

MWRA is committed to providing a reliable supply of high quality drinking water to its customers. In support of this goal, the Authority is undertaking a major waterworks capital initiative to ensure that the treatment, transport, and storage of water meets the highest quality standards and complies with state and federal regulatory requirements. The key projects of the initiative are the MetroWest Tunnel, the Walnut Hill Water Treatment Plant, and several covered storage projects.

While the wastewater system in general, and the Boston Harbor Project in particular, have been the focus of prior capital budgets, MWRA has made significant progress in the waterworks area, completing the rehabilitation of water pipelines in Stoneham, Woburn, Everett, and Chelsea; an interim corrosion control facility at the Wachusett Reservoir; rehabilitation of the Oakdale hydroelectric power generator; upgraded and replaced chlorination facilities at Weston and Norumbega Reservoirs; and PCB and asbestos abatement programs.

Program Categories

MWRA divides the Waterworks System Improvements program into four categories: Drinking Water Quality Improvements, Transmission, Distribution and Pumping, and Other Waterworks Projects.

Drinking Water Quality Improvements

The Drinking Water Quality Improvements (DWQI) category includes capital projects necessary to improve and preserve drinking water quality. MWRA maintains seven active surface reservoirs: the Quabbin, Wachusett, Weston, Norumbega, Nash Hill, Fells, and Spot Pond. A fundamental component of the long-term plan to improve drinking water quality is the construction of the Walnut Hill Water Treatment Plant, a 450 million gallons per day treatment facility sited at the Wachusett Reservoir. The plant will include disinfection, corrosion control, and enclosed storage facilities, and may include a filtration component if current watershed protection efforts are not deemed adequate to meet state and federal water quality standards. The decision to include filtration will be made by 1998, the current schedule established with the Commonwealth's Department of Environmental Protection (DEP). Construction of a water treatment facility with a full filtration component is estimated to cost $407 million and be completed by the year 2004.

As part of a complementary strategy to protect source water and actively treat drinking water supplies, the budget includes projects designed to preserve and protect the natural watersheds which supply the Quabbin and Wachusett reservoirs. The Watershed Protection project includes MWRA's contribution of $8.6 million for the construction of wastewater interceptors for the towns of West Boylston and Holden, which are located in the Wachusett Reservoir watershed. A watershed protection plan for the Sudbury Reservoir, MWRA's only emergency water supply source, is also underway.

Transmission

MWRA's water transmission system extends from the Quabbin Reservoir in western Massachusetts to metropolitan Boston. The system consists of a series of tunnels, aqueducts, and pipelines which transport water from supply reservoirs to user communities. The current transmission system lacks redundant capacity to ensure continuous supply in the event of flow impairment in any aqueduct. The new MetroWest Tunnel will address this deficiency and other projects are under study to provide redundant capacity.

The MetroWest Tunnel will provide redundancy for the Hultman Aqueduct, which currently transmits 85 percent of the water to the service region. MWRA expects the new 17.5 mile tunnel to be operational in 2004, when it will become the system's primary transmission line. MWRA is also designing several other major projects in accordance with the tunnel's planned configuration and operational mode. The construction schedules for the Norumbega covered distribution storage facility and the Walnut Hill Water Treatment Plant coincide with the anticipated completion date for the MetroWest Tunnel.

The proposed CIP also includes $81,000 for a preliminary study of the feasibility of restoring the Winsor Dam Hydroelectric plant back to service. Repair of the dam in Belchertown will allow MWRA to produce hydropower which will be used to supply the needs of the MWRA/MDC buildings in the area, including the proposed interim disinfection facility for the Quabbin Reservoir. Excess power could be sold, or potentially wheeled to other MWRA facilities.

Other projects in this category support additional transmission system improvements, and include projects to replace control valves and sluice gates at the Wachusett and Sudbury Reservoirs, and to provide a redundant water supply for the communities served by the Chicopee Valley Aqueduct through a series of connections to non-MWRA water systems in Springfield and Holyoke. The budget for these projects, scheduled for completion by 2004, is $13.6 million.

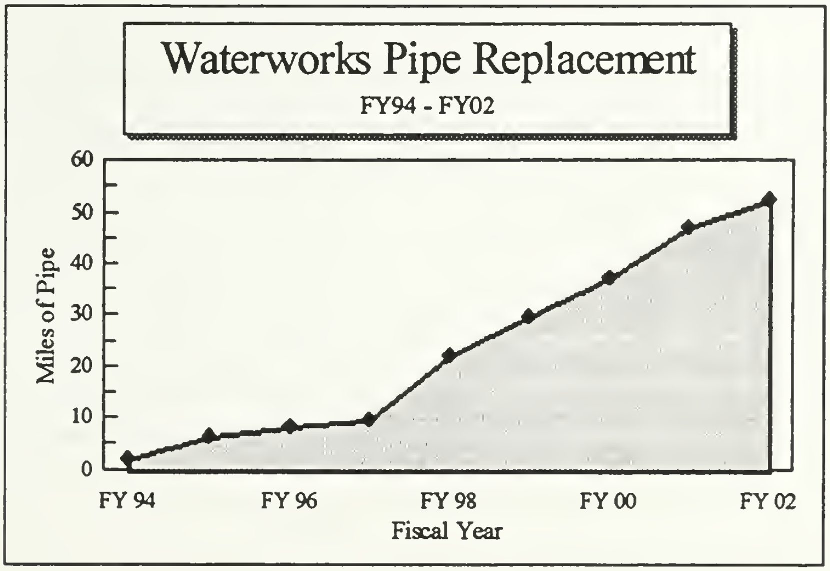
Distribution and Pumping

The water distribution system within the metropolitan Boston area includes 265 miles of pipelines, many of which have inoperable valves and severely restricted carrying capacity. Most of the pipelines are between 40 and 100 years old and are reaching the end of their useful lives. Almost 20 percent are more than 100 years old, and approximately 75 percent are unlined. MWRA has developed a renewal and replacement program to assure reliable service, prevent leakage, and preserve water quality.

The Distribution and Pumping category includes an extensive renewal and replacement program for distribution system components such as pipelines, valves, covered storage facilities, and pumping stations. The category includes projects to rehabilitate 75 miles of pipeline, replace 42 miles of pipeline, and construct 36 miles of new water mains at a total cost of $451 million. The pipeline renewal program began in 1990 and will continue into the next century.

The graph below presents a summary of new and rehabilitated waterworks pipeline completed or scheduled for completion. Miles of pipeline represented through FY96 reflects cumulative completed miles; FY97 through FY02 reflects cumulative miles projected for completion based on the individual project schedules included in this CIP.

Actual and Projected Miles of Waterworks System Pipe Replacement



Additionally, MWRA has invested in revenue meter modernization, resulting in more accurate billing of customer communities for water supplied by MWRA. Data from the new meters and telemetry system permits MWRA to monitor flows throughout the system and more precisely monitor actual water use. The revenue meter project includes installation of 130 meters. The first two phases of the project were completed in 1994 at a cost of approximately $12.9 million. The remaining phases have been incorporated into appropriate capital projects and the costs have been allocated accordingly.

The Distribution and Pumping category also includes $215,000 for a cathodic protection study and $11.8 million to fund valve replacements through 2006. Cathodic protection systems retard corrosion on steel pipelines. Blow-off valve replacements reduce the risk of water contamination. Mainline valves permit the isolation of pipe segments to facilitate service and repairs.

In concert with the pipeline rehabilitation and replacement projects described above, MWRA is modernizing and rehabilitating four pump stations, and investigating the rehabilitation requirements of the system's five remaining pump stations. The existing stations range in age from 30 to 90 years. Many of them still operate with their original equipment.

Other Waterworks Projects

This category includes projects for equipment replacement, building and bridge repairs, central monitoring system development, mapping, and the Local Water Infrastructure Rehabilitation Assistance Program. The Infrastructure Rehabilitation Financial Assistance Program includes an additional $7.5 million in this proposed CIP for the grant portion of the budget. The budget also includes $4 million for implementation of a Facilities Maintenance Program as part of the Rehabilitation of Existing Facilities project. The budget for these projects, expected to continue through 2006, is $22.3 million.

BUSINESS AND OPERATIONS SUPPORT

Overview

Capital projects included in the Business and Operations Support program have an Authority-wide focus, and assist all Divisions in achieving service goals. These projects include improvements to MWRA facilities which serve multiple operational and administrative purposes and may house a combination of staff from the Waterworks, Sewerage, Program Management, Finance, and Central Support divisions.

Project Status

The program includes four projects: North Maintenance Facilities, Fore River Staging Area, Technical Assistance, and the Business Systems Plan.

- North Maintenance Facilities: Site selection has been narrowed to two potential sites, with final site acquisition scheduled in 1997.
- Fore River Staging Area: Includes a new phase for demolition work at FRSA.
- Business Systems Plan: Implementation of improvements to the Authority's network infrastructure and PBX system are underway.

CONTINGENCY FUNDS

MWRA maintains two Capital Budget Contingency funds for each fiscal year, one for the Boston Harbor Project, and one for all other projects. The funds provide a mechanism to address unanticipated or unpredictable changes associated with capital projects. Transfers from the funds to the budget for a capital project phase can be made at any time during the fiscal year. Such transfers occur when the Executive Director authorizes or the Board of Directors approve either a contract award amount higher than the budgeted figure for a project phase, or change orders and contract amendments that result in costs greater than budgeted. The Rates and Budget Department prepares monthly reports on current and cumulative transfers from the contingency funds.

CAPITAL FINANCING AND GRANT REVENUES

Capital Program Financing

MWRA uses two primary sources of funds to finance its capital program: proceeds from borrowing and grant funds. Including the most recent issue made in the fall of 1996, outstanding revenue bonds total $2.8 billion as of November 30, 1996. MWRA is currently rated an A credit by Standard & Poor's (S&P), Moody's, and Fitch.

In addition, MWRA has borrowed from the Commonwealth's Water Pollution Abatement Trust, also know as the State Revolving Loan Fund (SRF). The gross amount of outstanding debt from the SRF as of September 28, 1996, is $289.5 million. The net amount of outstanding SRF debt, assuming payment of contract assistance by the Commonwealth, is $222.5 million. In FY95 the Authority initiated a tax-free commercial paper program to increase its borrowing flexibility and reduce interest costs. Outstanding commercial paper totaled $247 million as of November 30, 1996.

The MWRA budgets for bond principal and interest payments in its annual Current Expense Budget (CEB). In FY97 the debt service budget is $164 million, net of $39 million for debt service assistance from the Commonwealth of Massachusetts. As a result of the long-term financing necessary to fully implement the capital program, the Authority anticipates that annual debt service payments will continue to increase each year at least through 2004.

Grant Revenues

Grant receipts are also a significant source of funds, estimated to total $802.2 million through June 30, 1997. The following table presents projected combined receipts from federal and state construction grant programs, as well as from special federal grant appropriations (including the Section 513 Program), for FY98-00 and beyond. Total grant support is projected to be $129.5 million or 8.8 percent of expenditures in the three-year budget period.

PROJECTED GRANT REVENUE
($000)

Grant Program	FY 98	FY 99	FY 00	Total FY 98-00	Beyond FY 00
Construction Grants	$14,846	$2,832	$0	$17,678	$0
Special Federal Grants	$53,656	$52,951	$5,218	$111,825	$2,688
TOTAL	**$68,502**	**$55,783**	**$5,218**	**$129,503**	**$2,688**

After projected FY98-00 grant revenue is subtracted from capital requirements, the amount that MWRA must finance is $1.3 billion, as shown below.

CAPITAL BUDGET FINANCING REQUIREMENT
($000)

Program	Total FY 98-00 Capital Requirements	Projected Grant Receipts	Total FY 98-00 Ratepayer Financing Requirements
Wastewater	$680,947	$129,503	$551,444
Waterworks	$619,103	0	$619,103
Business and Operations Support	$18,626	0	$18,626
Contingency	$139,692	0	$139,692
TOTAL	**$1,458,368**	**$129,503**	**$1,328,865**

Grant and Loan Assumptions

MWRA has made the following assumptions in this budget concerning financial assistance programs:

- Federal Title II Construction Grants Program

  No new grant awards. A very limited amount of funds may be available to provide grant increases to cover increased contract costs and to close out grants.

- Special Federal Grants

  The federal government has appropriated $654 million to date in support of MWRA's wastewater capital program. This includes $75 million appropriated in FY97 for the Boston Harbor Project. This budget assumes no further appropriations. MWRA will continue to pursue additional federal appropriations.

- Massachusetts Grants Program

  Some state funds will be available to provide increases to cover increased contract costs and to close out grants.

- State Revolving Loan Fund

  MWRA has received $319.5 million in loans to date from the SRF, and expects to receive an additional $70.2 million in FY97. Terms of SRF loans are more favorable than those available in the revenue bond market. Additional SRF loan funding will be pursued, but the amount of new loans will depend upon additional federal and state appropriations to capitalize the SRF loan fund.

  Loans will have a 20-year maturity with repayment beginning two years after the date of the loan.

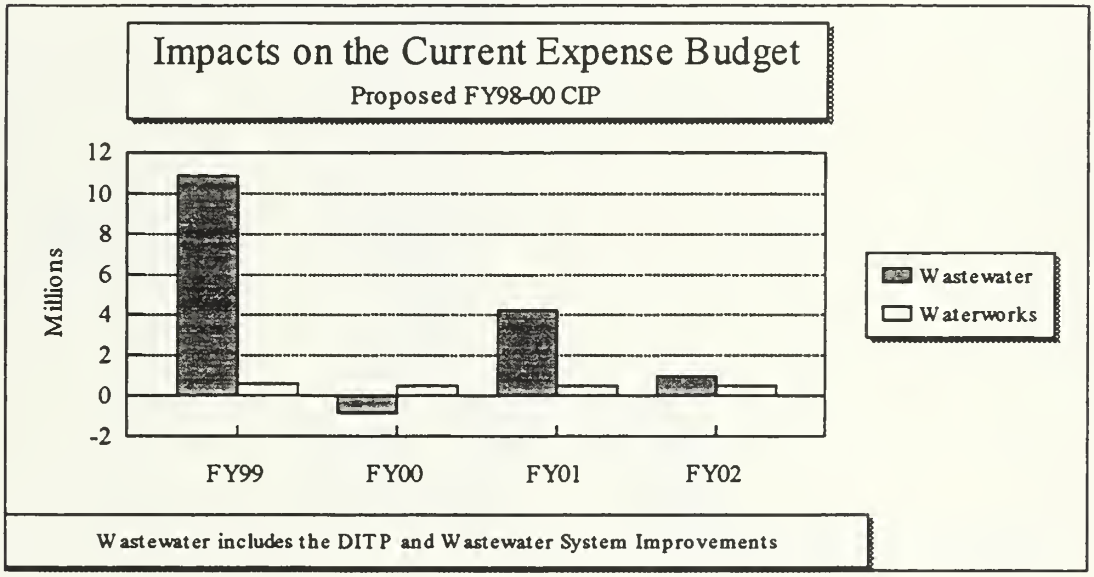
This budget assumes no SRF loans for drinking water projects. Although Congress created and funded an SRF program for drinking water projects in 1996, no guidance has been promulgated regarding the use of such funds at this time. The MWRA will continue to press for quick resolution of outstanding issues and will pursue funds for drinking water capital projects.

IMPACTS ON THE CURRENT EXPENSE BUDGET

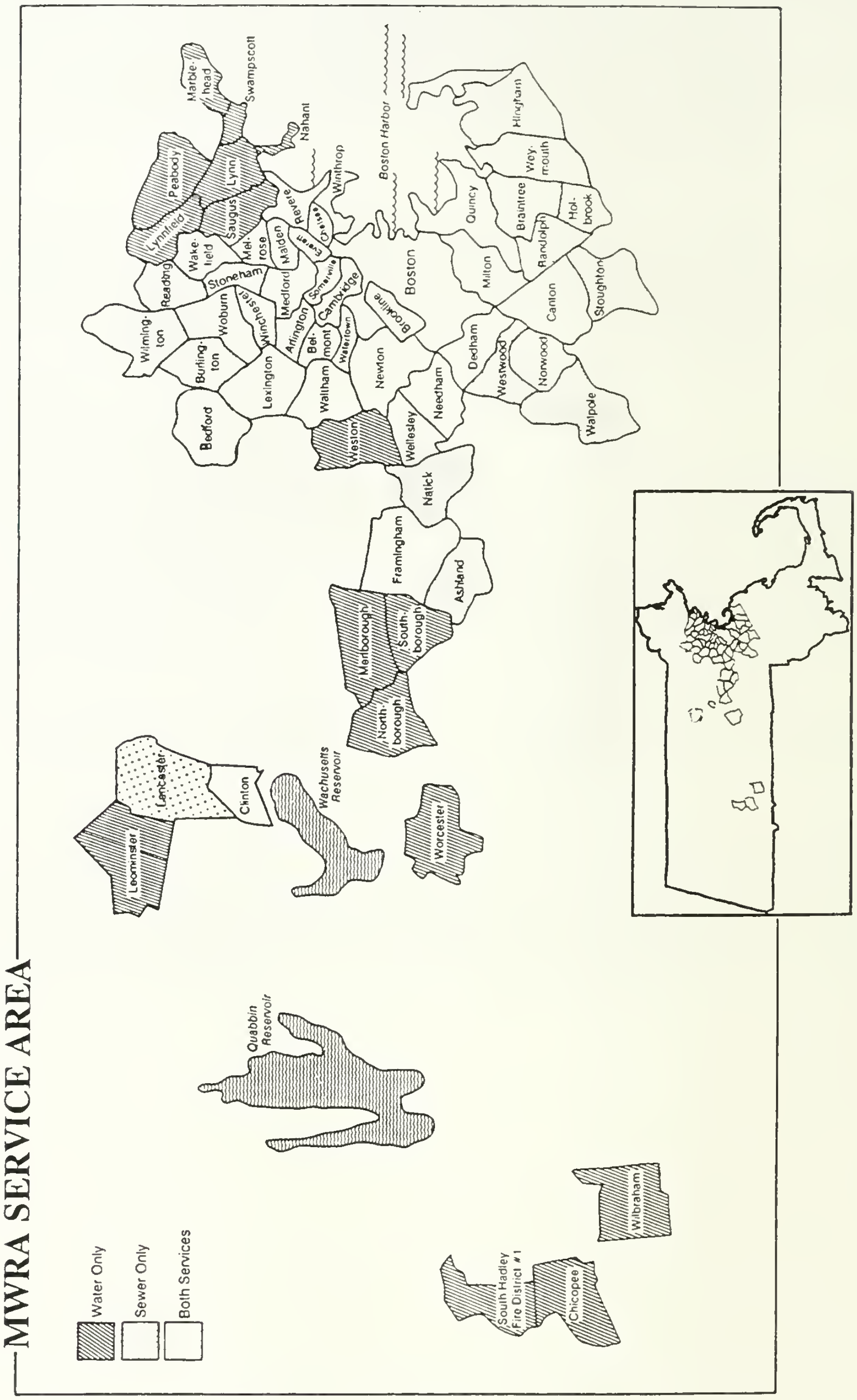
Impacts of New Operations

In addition to the annual financing costs included in the Current Expense Budget, the Capital Improvement Program affects annual operating budgets when capital facilities come on-line, requiring adjustments to staffing levels and other operating expenses. The project descriptions in this document provide information concerning the projected amount and timing of the CEB impacts for the years beyond FY98.

The following graph summarizes, by program, the estimated incremental impact of additional operating costs on MWRA's Current Expense Budget from FY99 through FY02. Impacts include savings resulting from capital improvements which will reduce labor, utility, or maintenance costs.



MWRA SERVICE AREA



WASTEWATER

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
AND
CAPITAL EXPENDITURE BUDGET
FY 1998 - FY 2000

Introduction

The MWRA's wastewater system consists of collection, transport, pumping, treatment, and disposal of sewage received from 43 communities serving more than two million people. The Sewerage Division is responsible for operation and maintenance of the system including 230 miles of interceptor sewer lines, nine pumping stations, four headworks, three treatment plants, and six combined sewer overflow facilities for the screening and chlorination of combined sewerage and stormwater. The wastewater system receives sewerage flows from 5,400 miles of city and town sewers at 1,823 connection points.

The Sewerage Division is responsible for identification of the wastewater system's capital needs, including planning, design, and construction of all capital improvements.

Capital Budget Summary

The proposed Wastewater improvement program budget for the three year period FY98 - FY00 is $680.9 million. The program is comprised of five program categories: Interception and Pumping, Treatment, Residuals Management, Combined Sewer Overflows, and Other capital projects. The table on the following page presents projected expenditures in each of the five program areas. Retainage payments due for completed projects are also included in the totals. These figures include expenditures for which the Authority expects to receive reimbursement under federal and state grant programs.

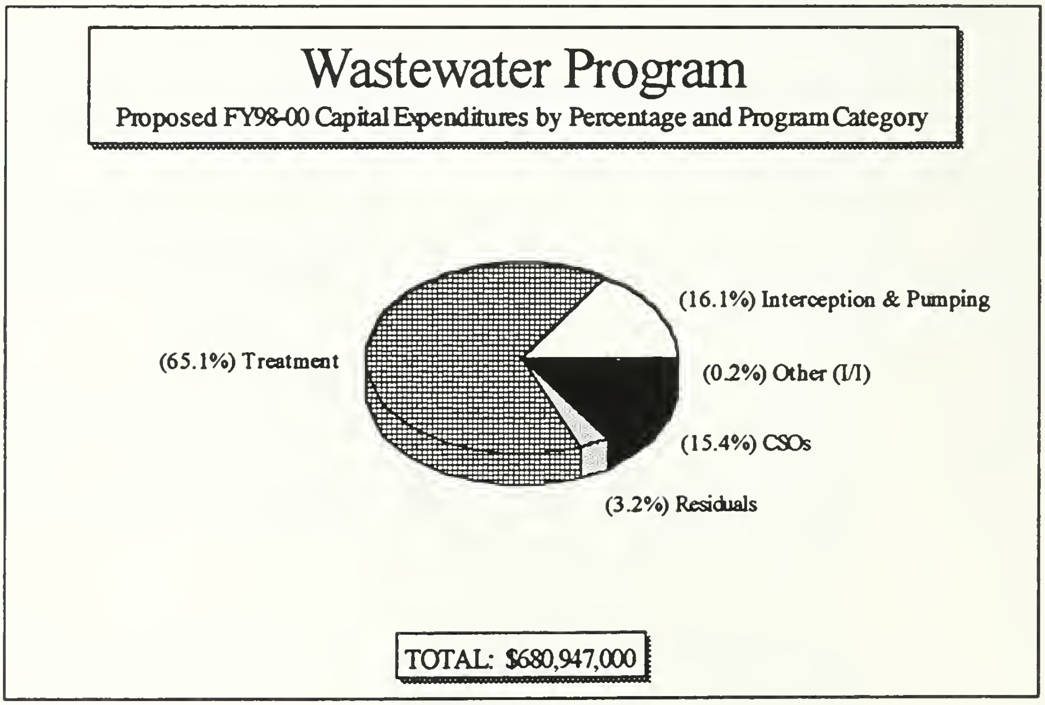
An additional $416.5 million in expenditures beyond FY00 will be needed for project phases scheduled for completion after June 30, 2000. This figure includes the current estimated cost of construction of the Deer Island Secondary Treatment Plant, additional residuals management facilities, and a long-term program for control of combined sewer overflows.

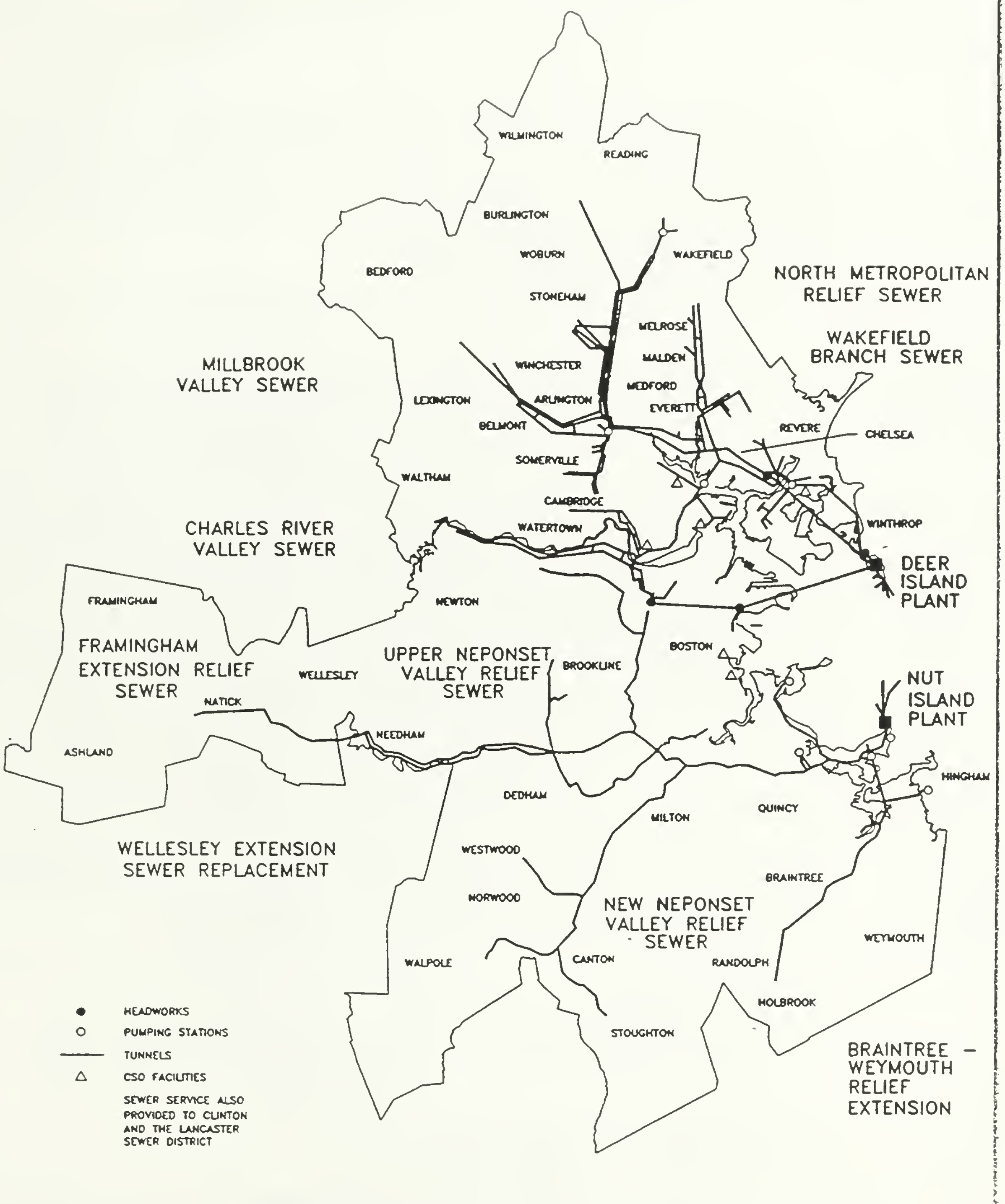
Descriptions of the individual capital projects in each program category follow this summary. Expenditure forecasts and project schedules for the proposed Wastewater improvement program are summarized in the following project narratives, and presented in detail in the Proposed FY98 - 00 CIP *Supplement*.

Wastewater Program by Program Category
($000s)

Program Category	FY98	FY99	FY00	FY98-00 Total	Beyond FY00
Interception & Pumping	$24,923	$21,635	$63,078	$109,636	$109,196
Treatment	191,943	185,797	65,709	443,449	9,561
Residuals Management	17,473	4,008	0	21,481	675
CSO	23,766	36,048	45,365	105,179	307,934
Other*	(666)	(266)	2,134	1,202	(9,061)
Total	$257,439	$247,222	$176,286	$680,947	$418,305

* Negative numbers indicate positive cash flows from repayment of loan portion of the I/I Program.





MWRA SEWERAGE SYSTEM

1101. Quincy Pump Facilities

Purpose

Quincy Pump Facilities (Quincy, Squantum, Hough's Neck) are beyond their useful lives and prone to failure. Force mains connected to the stations are corroded and maintain a very low velocity resulting in high energy losses due to friction and other flow constraints. New pump stations will be constructed and force mains will be rehabilitated to ensure the continuous pumping of sewage flows to the Nut Island Treatment Plant.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Facilities Plan/EIR	$526	Dec 87	Mar 95
Design/CS/RI/Land Acquisition	$4,144	Jul 91	Jul 01
Construction/Legal/Hazardous Waste/Public Relations	$18,903	Jul 89	May 02
Technical Assistance	$44	Dec 87	Jan 02
TOTAL:	$23,617		

Project History and Background

The Quincy Pump Facilities, serving the City of Quincy, include the Quincy Pump Station, Hough's Neck Lift Station, Squantum Pump Station, and associated force mains. Background for each pump station is included below.

- Quincy Pump Station is a 21.5 million gallons per day (mgd) facility in operation since 1906.
- Squantum Pump Station is an eight mgd facility built in the late 1930s.
- Hough's Neck Lift Station is a one mgd facility in service since 1942.

The two existing force mains include:

- Quincy Force Main, comprised of two 3,000 foot force mains. One main, 24 inches in diameter, was built in 1902 and has a remaining useful life of less than five years. The other, 30-inches in diameter, was built in 1923.
- Squantum Force Main, built in 1972, is 19,000 feet long, and ranges in diameter from 24- to 30-inches.

Scope

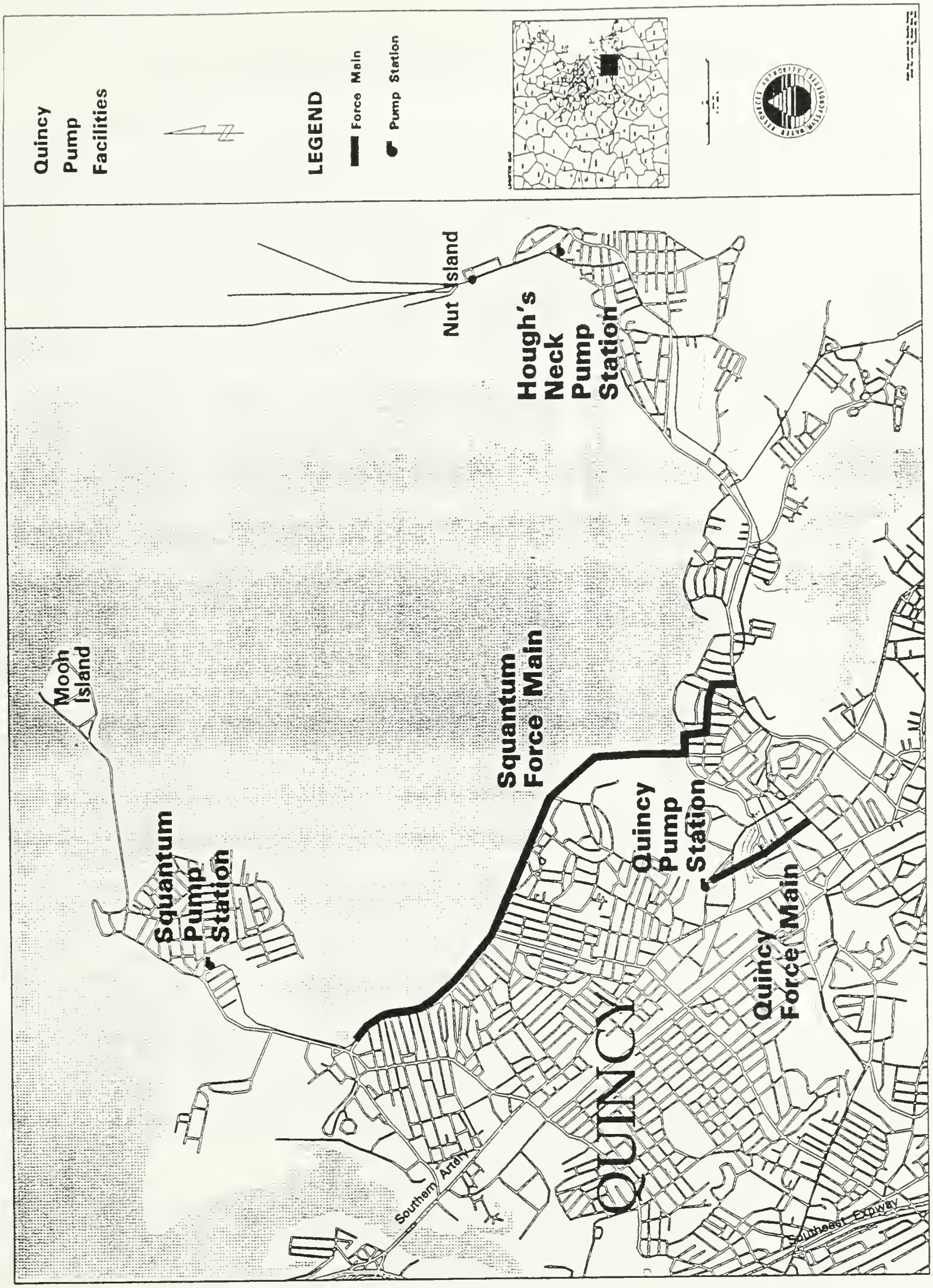
Phase	Scope
Facilities Plan/EIR	Evaluate existing conditions, propose improvements, and assess the impacts of those improvements.
Design/CS - Rehab	Design of the Construction-Rehab phase.
Construction - Rehabilitation	Short term improvements: installation of a heating unit and a prime mover at Quincy Pump; two four mgd pumps with AC drives, ships ladders, back-up equipment, and an additional four mgd sewage pump to serve as an emergency back-up at Squantum Pump; electrical upgrade including alarm and generator room improvements.
Land Acquisition	Acquire land for new Squantum Pump Station.
Design/CS/RI 1	Provide design & CS/RI for Construction 1-3, 5, & 6.
Construction 1	Construction of a new eight mgd Squantum Pump Station.
Construction 2	Construction of a new 26 mgd Quincy Pump Station.
Construction 3	Construction of a new 1.5 mgd Hough's Neck Pump Station.
Construction 4	Rehabilitation of 4,576 linear feet of the Squantum Force Main through installation of a cured-in-place resin-impregnated flexible liner.
Construction 5	Rehabilitation of the remaining 14,400 linear feet of the Squantum Force Main by cleaning and application of a cementitious lining.
Construction 6	Rehabilitation of the existing 30-inch Quincy Force Main and abandonment of the existing 24-inch Quincy Force Main.
Technical Assistance	Design services for Squantum Force Main early rehabilitation and Construction 4.
Legal	Legal expenses, as required, associated with resolving construction or design issues or claims.
Public Relations	Expenses associated with resolving technical issues with the community and project abutters arising from project implementation.
Hazardous Waste	Expenses associated with disposal of hazardous waste identified during construction.

Changes in Scope Since FY97-99 CIP None.

CEB Impact

CEB line item	FY99	FY2000	FY2001	Description
Utilities	$5,320	$1,774	$9,587	All three pump stations will be electrically operated.
Maintenance	$10,091	$1,035	$14,249	Increased use of instrumentation controls requires extensive preventive maintenance.
Other	$10,661	$3,208	$16,387	One time start-up expenses such as computers and office furniture are required.
TOTAL:	$26,072	$6,017	$40,223	

Expected start-up of Quincy Pump Facilities:
Quincy Pump Station - August 2001 (FY2002)
Squantum Pump Station - September 2000 (FY2001)
Hough's Neck Pump Station - October 1998 (FY99)



1101. Quincy Pump Facilities
Interception and Pumping

1102. Braintree-Weymouth Relief Facilities

Purpose

Construction of new relief facilities and the resulting reduction in community infiltration and inflow will provide capacity for peak sewage flow in Braintree, Hingham, Holbrook, Randolph, Weymouth, and sections of Quincy. This project will reduce surcharging in Braintree and Weymouth, and will reduce frequent sewage overflows into the Weymouth-Fore River.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study/Sediment Tests	$2,520	Oct 81	Apr 96
*Design/CS/RI/Land Acquisition	$25,059	Jul 91	Jun 02
Construction/Legal/Public Relations/Hazardous Waste	$111,235	Jan 92	Jun 02
Technical Assistance	$101	Nov 84	May 02
TOTAL:	$138,915		

* Budget includes the costs associated with a dual track design approach for determining the best solution for transporting effluent from the new pump station to the Nut Island shaft. The dual track will concurrently develop designs for both a deep rock tunnel and marine pipeline alternative until the feasibility and cost effectiveness of a marine pipeline can be verified. MWRA does not expect to incur the total budgeted cost for design of both alternatives and anticipates the total design cost to be approximately $10 million. The current construction budget assumes the deep rock tunnel alternative.

Project History and Background

The Braintree Weymouth Interceptor System and Pump Station serve Braintree, Hingham, Holbrook, Randolph, Weymouth, and sections of Quincy. Population increases in these communities have resulted in a sewerage system that cannot support the volume of sewage received. Sewage overflows are severe and frequent along the Weymouth-Fore River.

Interim rehabilitation work is required to ensure continued operation of the existing Braintree-Weymouth pump station during the long-term design and construction period. Rehabilitative work accomplished to date includes installation of a motorized influent gate and a mechanical bar screen, as well as heating improvements.

MWRA is proceeding with a dual track design approach for part of this project. Planning and design of a marine pipeline from the new pump station (Construction 2) to the Nut Island shaft is being pursued on a dual track with design of a deep rock tunnel (Construction 1), since it may be more cost-effective.

Scope

Phase	Scope
Draft Facility Plan	Prepare Facilities Plan for work associated with the Braintree-Weymouth project.
Draft EIR	Prepare EIR for work associated with the Braintree-Weymouth project.
Final EIR /Facility Plan	Planning and EIR work associated with the revised Braintree-Weymouth project.
Geotechnical-Land	Geotechnical investigation of areas associated with construction on land.
Geotechnical-Marine	Geotechnical investigation of areas associated with construction in river and harbor.
Design 1/CS/RI - Tunnel & IPS	Design of construction contracts 1 & 2. Includes completion of design modifications for valve chamber at Deer Island.
Design 2/CS/RI - Surface	Design of construction contracts 3 through 8, Siphons, and Braintree-Weymouth Relief Pump Stations.
Design 3/CS/RI Marine Pipeline	Design of marine pipeline alternative.
Sediment Tests	Assist with evaluation of marine pipeline option.
Land Acquisition	Purchase pump station land from Boston Edison; acquire easements for relief sewer from Braintree and Weymouth property owners, and other land owners.
Construction 1	Construction of a 2.9 mile, 12-foot diameter Braintree-Weymouth Tunnel beginning at the Nut Island Shaft and ending at the Fore River Staging Area. Two 14-inch sludge pipelines will convey Deer Island sludge from the Inter-Island tunnel to the pelletizing plant. 0.4 miles of twin 14-inch filtrate pipelines will convey filtrate from the pelletizing plant to the North Weymouth pumping station. 2.5 miles of 48-inch force main will carry relief flows and filtrate to the Inter-Island Tunnel.
Construction 2	Construction of a 60 mgd pumping station/headworks in North Weymouth. Also includes modifications to the sludge pumping facilities at Deer Island and the filtrate pumping facilities at Fore River.

Construction 3	Construction of 2,000 linear feet of 60-inch gravity sewer running from the North Weymouth pump station and along the Boston Edison Edgar Station property.
Construction 4	Installation of 48-inch, 1,800 foot long twin siphon from the Edison site across the Fore River to E. Braintree.
Construction 5	Construction of 1,000 linear foot of 60-inch gravity sewer along the E. Braintree shoreline to new 42-inch, 800 linear feet siphon between E. Braintree and Weymouth and then extending 2,100 linear feet along the shore of Idlewell to Mill Cove.
Construction 6	Construction of a new 13 mgd Braintree-Weymouth pump station that will handle approximately 19 percent of existing flow.
Construction 7	Downsizing the existing 1,700 linear feet of twin 54-inch Fore River Siphon by inserting a twin 24-inch siphon within the existing siphon from Germantown to N. Weymouth.
Construction 8	Downsizing 2,800 linear feet of 60-inch N. Weymouth sewer by inserting a 42-inch sewer within the existing sewer.
Design-Rehab	Design of Construction-Rehab phase.
Constr-Rehab	Interim rehabilitation of the existing Braintree-Weymouth Pump Station that includes relocating an existing A.C. generator with D.C. rectifier and new vacuum pumps. Transport Department will install existing generators instead of buying new emergency generators.
Legal	Legal expenses associated with resolving construction or design issues or claims.
Public Relations	Expenses associated with resolving technical issues with the community and project abutters arising from project implementation issues.
Hazardous Waste	Expenses associated with disposal of hazardous waste identified during construction.
Technical Assistance	Provided for the installation of a sluice gate and a bar screen.

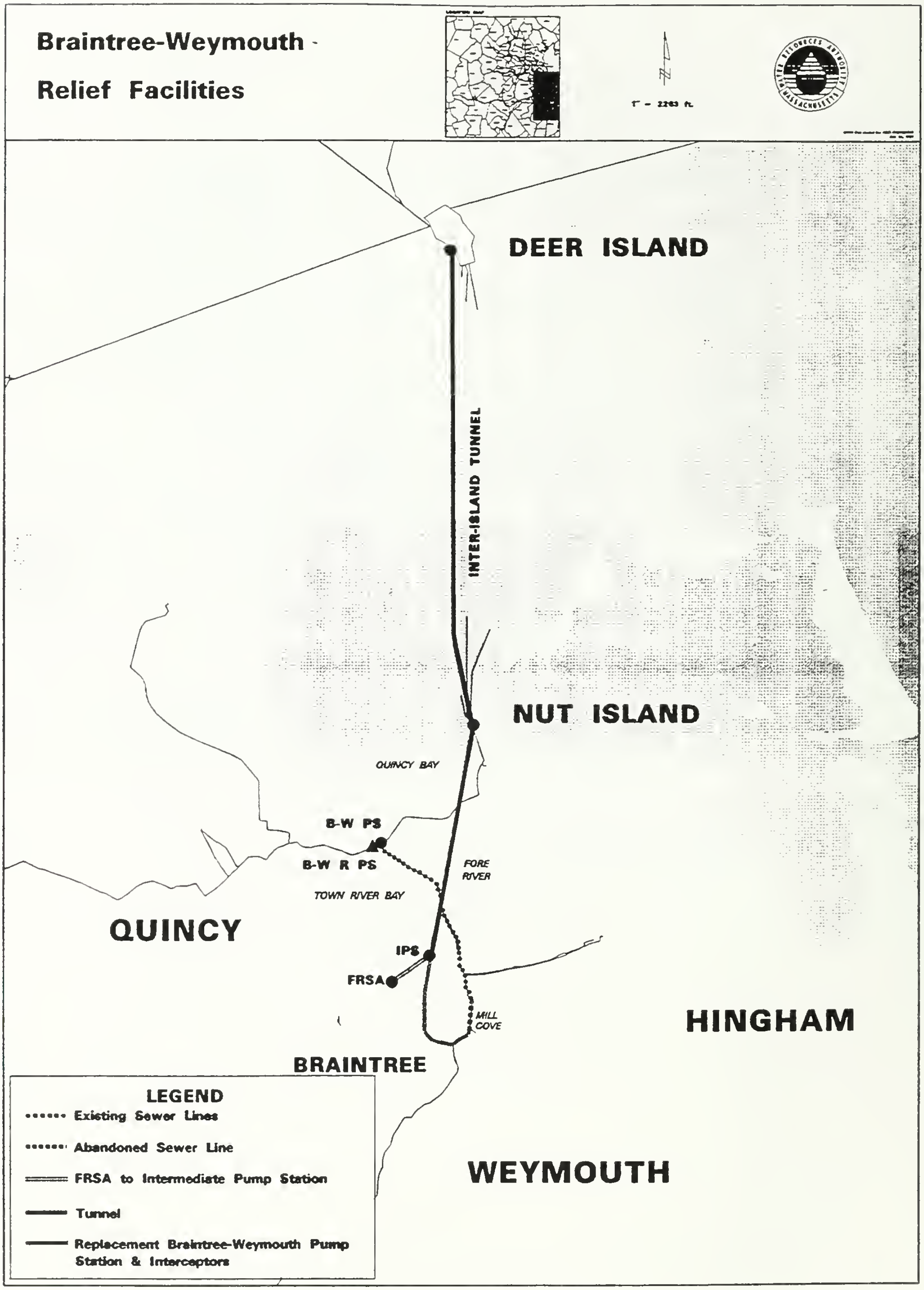
Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB line item	FY02	FY03	Description
Labor	($117,158)	($123,437)	Staff reduction from ten to six due to the transition from diesel (manual) to electric (automatic) pumps.
Chemicals	$39,703	$79,405	Carbon absorption odor control systems will be installed at the B-W Relief and B-W Intermediate Pump Stations.
Utilities	$185,799	$361,020	Both pump stations will be electrically operated.
Maintenance	($5,350)	$11,547	Increased use of instrumentation controls requires extensive maintenance.
Other	$119,651	$186,008	One time start-up expenses such as computers and office furniture are required at the new pumping facilities.
TOTAL:	$222,645	$514,543	

Expected start-up of Braintree-Weymouth Relief Pump Stations:
Braintree-Weymouth Relief Pump Station - February 2002 (FY2002)
Braintree-Weymouth Intermediate Pump Station - March 2002 (FY2002)



1102. Braintree-Weymouth Relief Facilities
Interception and Pumping

1103. New Neponset Valley Relief Sewer

Purpose

The structural and hydraulic deficiencies of the New Neponset Valley Interceptor Sewer System have led to surcharging and sewage overflows which, combined with other pollution sources, threaten the Neponset River Watershed, the water supply for Canton and the Dedham/Westwood Water Authority. Construction of new relief facilities is needed to mitigate current problems and to accommodate the anticipated increase in demand caused by population growth in the service area. The project achieved substantial completion in September 1996.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study/Environ. Consultant	$2,424	Apr 83	Jul 97
Design/CS/RI/Land Acquisition	$5,240	Feb 89	Sep 96
Construction	$23,581	Sep 93	Sep 96
Technical Assistance	$189	Apr 88	Mar 96
TOTAL:	$31,434		

Project History and Background

The New Neponset Interceptor Sewer System consists of the New Neponset Valley Sewer, the Westwood Extension Sewer, the Walpole Extension Sewer, the Stoughton Extension Sewer, and the Dedham Branch Sewer. The system serves Walpole, Stoughton, Canton, Norwood, Westwood, and parts of Dedham, Hyde Park, and Milton. Structural deficiencies within the system include deteriorated manhole risers, improper castings, structural damage due to superimposed loadings, and segments that require cleaning. Hydraulic problems include a six mgd deficiency in the downstream segment and approximately 22 mgd in several upstream segments. Such inadequacies occur during heavy rainfall and cause surcharging and sewage overflow to ground surfaces and adjacent water bodies.

The sewered population is expected to increase from 81,000 to 136,600 by 2002 primarily due to the expected conversion from septic tanks to sewer service in the towns of Canton, Stoughton, Walpole, and Westwood.

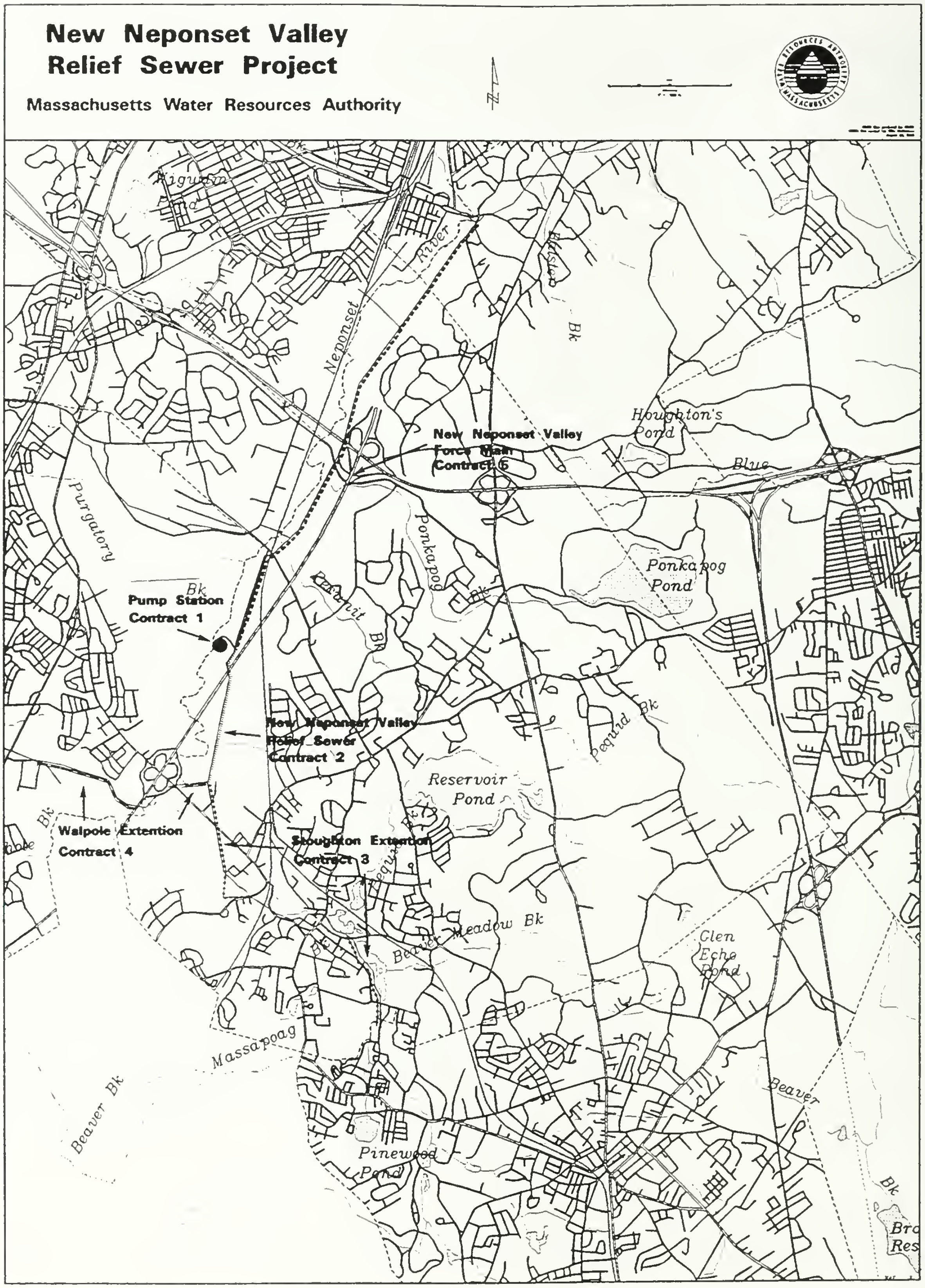
Construction of new relief facilities commenced in 1993. The pump station began operating in March 1996.

Scope

Phase	Scope
Facilities Plan	Evaluate existing conditions, propose improvements, and assess the impacts of those improvements.
EIR/Supp. Facility Plan	Further evaluation required and performed through MEPA.
Design/CS/RI	Design and CS/RI for Construction contracts 1-5.
Land Acquisition	Land taking, easements, and litigation to allow for construction phases to occur.
Consultant-Milton & Canton	Engagement of an environmental monitor for the Milton and Canton Conservation Commissions to oversee the wetlands related work performed within the respective jurisdictions. Services continue through November of 1997.
Construction 1	Construction of a 46 mgd pump station and 2,850 linear feet of 48-inch force main.
Construction 2	Installation of 5,900 linear feet of 54-inch gravity sewer for the New Neponset Valley Relief Sewer.
Construction 3	Installation of 5,330 linear feet of 36-inch gravity sewer for the downstream section and 4,055 linear feet of 24- to 30-inch gravity sewer for the upstream section of the Stoughton Extension Sewer.
Construction 4	Installation of 6,920 linear feet of a 30- to 48-inch gravity sewer for the Walpole Extension Sewer.
Construction 5	Installation of the remaining 18,544 linear feet of 48-inch force main for the New Neponset Valley Relief System.
Study Dedham Street	Study to determine if a section of settled sewer line was subsequently repaired in the early 1960s and whether it may have contributed to groundwater contamination.
Power Line	Installation of power and telephone utilities.
Technical Assistance	On-going environmental assistance contracts (wetlands restoration and revegetation experts, experts on endangered species, etc.)

Changes in Scope Since FY97-99 CIP	None.

CEB Impact	None.


New Neponset Valley Relief Sewer Project
Massachusetts Water Resources Authority
New Neponset Valley Force Main Contract 6
Pump Station Contract 1
New Neponset Valley Relief Sewer Contract 2
Walpole Extention Contract 4
Stoughton Extention Contract 3
Neponset River
Purgatory Bk
Ponkapog Bk
Houghton's Pond
Blue
Ponkapog Pond
Pequid Bk
Reservoir Pond
Meadow Bk
Beaver
Glen Echo Pond
Massapoag
Beaver Bk
Pinewood Pond
Beaver Bk

1103. New Neponset Valley Relief Sewer
Interception and Pumping

1104. Upper Neponset Valley Relief Sewer

Purpose

The Upper Neponset Valley Sewer is hydraulically deficient within Sections 26 through 29, resulting in frequent community system back-ups and interceptor overflows to adjacent residential areas and water bodies in Brookline, Boston, Newton, and Dedham. The construction of a new interceptor in three sections will reduce chronic wastewater overflows, thereby improving water quality.

As part of the System Master Plan Interceptors project, MWRA is evaluating the downstream impacts of this project. Pending completion of this evaluation in FY2000, MWRA will commence the planning and design of the New Upper Neponset Valley Relief Sewer.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Design/CS/RI	$2,998	Feb 00	Oct 03

Project History and Background

The Upper Neponset Valley Sewer (UNVS), constructed between 1896 and 1902, extends approximately four miles through the towns of West Roxbury and Newton, and receives wastewater from West Roxbury, Brookline, Newton, and a small portion of Dedham.

The size and slope of the sewer, both of which affect capacity, change dramatically in some areas, specifically in Sections 26 through 29. Section 29 ranges from a 12-inch circular pipe upstream to a 26-inch oblong pipe downstream. The sewer expands to a 45-inch by 48.5-inch oblong shape at the furthest downstream portion, Section 26. The average daily flow is 7.21 mgd with a peak flow of 23.6 mgd. The hydraulic capacity of these sections ranges from a low of 5.8 mgd to a high of 11.65 mgd with several capacity constraints along these segments. The difference between actual flows and the hydraulic capacity results in serious overflows and surcharges during periods of heavy rainfall.

The 1984 Wellesley Extension Sewer Facilities Plan/Environmental Impact Document (EID) estimated that the UNVS overflowed an average of six to ten times per year with occurrences lasting as long as ten days.

In 1980, the Department of Environmental Protection performed sampling and testing in the portion of the Charles River near the UNVS and found contamination. The report also indicated that the peak infiltration/inflow (I/I) to these sections of the UNVS can reach 16.09 mgd.

The Facilities Plan/EIR indicated that the installation of a new 10,800 foot interceptor is the most cost effective solution. With the increased capacity of the new interceptor ranging from 15.65 to 25.7 mgd, chronic wastewater overflows will be reduced, thereby improving water quality.

Scope

Phase	**Scope**
Planning/Design/CS/RI	Evaluate alternatives and recommend installation of a new 10,800 foot interceptor or the most cost-effective solution. Design, resident inspection, and construction services of Construction phase.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

None.

1105. Wellesley Extension Sewer Replacement

Purpose

The Wellesley Extension Sewer System is unable to convey all flows resulting in surcharging and overflows into the Charles River in parts of Dedham, Needham, Wellesley, Dover, and Natick, and endangering two water supplies: the Needham town wells and the Elm Bank Aquifer. Construction of a replacement sewer will alleviate capacity constraints, improve the water quality of the Charles River, protect the aquifers, and reduce back-ups in Needham and Dedham.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study	$734	Oct 81	Sep 96
Design/CS/RI/Land Acquisition	$12,671	Dec 84	Nov 00
Construction/Engineering and Inspection Consultant/Public Relations/Legal	$58,918	Jun 89	Nov 00
Technical Assistance	$193	Jun 89	Sep 95
TOTAL:	$72,516		

Project History and Background

The Wellesley Extension Sewer System is comprised of the Wellesley Extension Sewer, constructed between 1916 and 1921, and the Wellesley Extension Relief Sewer. Both sewers are situated along the Charles River and serve Needham, most of Wellesley, and part of Dedham. The Framingham Extension Sewer is also tributary to the Wellesley Extension Sewer System.

Seven of the eight construction contracts have been completed.

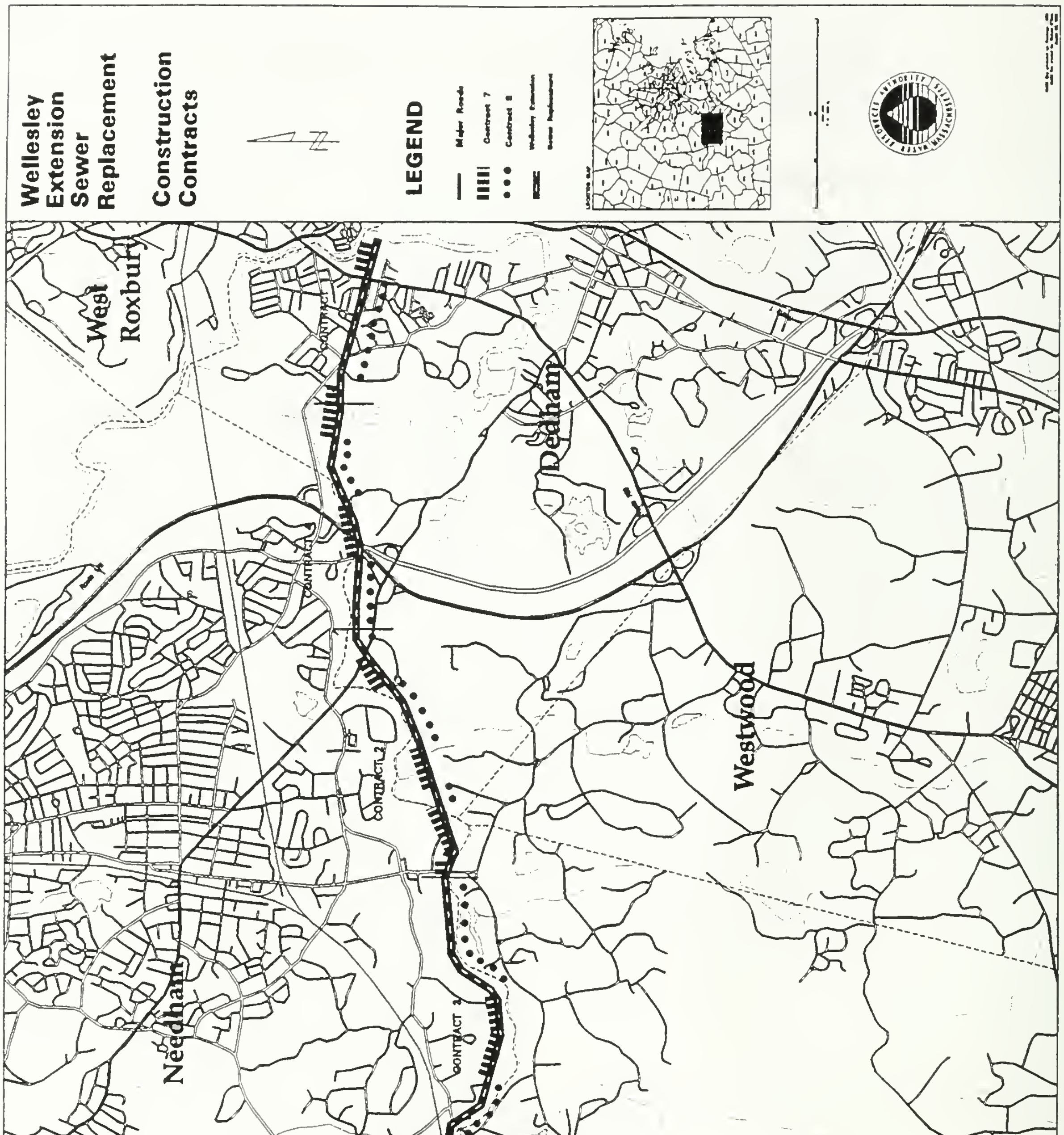
Scope

Phase	Scope
Study	Evaluate existing conditions, propose improvements, and evaluate impacts of those improvements.
Design/EIR/CS/RI	Perform all design and environmental studies and provide construction services/resident inspection during the construction phase.
Land Acquisition	Land taking, easements, and litigation to facilitate construction phases.
Consultant-Needham, Dover, Dedham	Engagement of consultants for the Needham, Dover, and Dedham Conservation Commissions to oversee wetlands related work performed within their respective jurisdictions.
Construction 1	Installation of 4,850 linear feet of 60-inch interceptor in Dedham, including a 3,040 linear foot tunnel, and abandonment of 300 linear feet of the Wellesley Extension Sewer (WES).
Construction 2	Installation of 6,720 linear feet of 54- to 60-inch interceptor located in Dedham and Needham, including a 230 linear foot river crossing and a 215 linear foot brook crossing.
Construction 3	Installation of 10,300 linear feet of 60-inch interceptor in Needham, including a 1,200 linear foot tunnel.
Construction 4	Installation of 6,170 linear feet of 54- to 60-inch interceptor in Dedham including a 160 linear foot pipe crossing the Charles River, a 450 linear foot Route 128 crossing, and the abandonment of 2,900 linear feet of the WES.
Construction 5	Installation of 9,500 linear feet of 60-inch interceptor in Needham, Wellesley, and Dover, including a 120 linear foot river crossing.
Construction 6	Installation of 7,540 linear feet of eight to 15-inch local sewers in Dedham and Needham, sliplining 1,600 linear feet, and abandoning 9,990 linear feet of the WES.
Construction 7	Rehabilitation of 37,217 linear feet of the Wellesley Extension Relief Sewer, relining of 8,850 linear feet of the Wellesley Extension Sewer Replacement (WESR), and abandoning 17,250 linear feet of the WES. Reline additional 978 linear feet of the WERS.
Construction 8	Relining of 19,100 linear feet of WESR.
Engineering and Inspection Consultant	Provides consulting services for design and inspection for protective coating systems to be installed in the North Metropolitan Trunk Sewer Rehabilitation Phase II and the Wellesley Extension Sewer Replacement Construction 8.
Legal	Legal expenses associated with resolving construction and design issues or claims.
Public Relations	Expenses associated with resolving technical issues with the community and project abutters arising from project implementation.

Technical Assistance	Preliminary assessment for contamination associated with Construction 1.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.



1105. Wellesley Extension Replacement Sewer
Interception and Pumping

1106. Framingham Extension Relief Sewer

Purpose

The Framingham Extension Sewer has inadequate capacity to serve current and projected demand, resulting in surcharging and discharging of sewage into local water bodies such as the Charles River and Beaverdam Brook. The installation of a new force main, construction of a new pump station, and rehabilitation of more than 23,000 linear feet of existing pipe will provide sufficient capacity to meet peak flows and reduce overflows.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study	$1,402	Feb 90	Jul 90
Design/CS/RI/Land Acquisition	$8,408	Jul 90	Oct 00
Construction	$37,362	Jun 94	Oct 00
Technical Assistance	$147	Feb 90	May 00
TOTAL:	$47,319		

Project History and Background

The Framingham Extension Sewer, constructed in the mid 1950s, is approximately 31,150 linear feet in length, with the diameter varying between 42- and 54-inches. The existing sewer receives wastewater from the towns of Framingham, Ashland, and Natick and transports these flows to the Wellesley Extension Sewer for eventual conveyance to the Nut Island Treatment Plant. The current peak wet weather flow is approximately 42.75 mgd.

The current population and expected growth, as well as the aging of the pipes, have led to deterioration and excessive discharging of the sewer system.

The new sewer system is designed for a peak flow of 43.65 mgd.

Scope

Phase	Scope
Facility Plan Update/EIR	Evaluate existing conditions, propose improvements, and evaluate the impacts of those improvements.
Land Acquisition	Land taking, easements, and litigation (if necessary) to facilitate construction.
Design/CS/RI	Design and construction services for Construction phases. Includes alternative option of jacking a portion of the gravity sewer, and additional conditions for restoration of the Charles River banks.
Construction 1	Installation of 25,000 linear feet of 36-inch force main in Framingham and Natick.
Construction 2	Installation of 11,000 linear feet of 36-to 60-inch gravity sewer in Natick, Wellesley, and Dover. Microtunneling under a 150-year old oak tree on Elm Bank.
Construction 3	Construction of a 21 mgd pump station in Framingham.
Construction 4	Rehabilitation of 7,439 linear feet of 42- to 48-inch sewer in Framingham and Natick.
Construction 5	Rehabilitation of 15,830 feet of sewer in Natick and Dover.
Technical Assistance	Technical assistance as needed in support of all construction contracts.

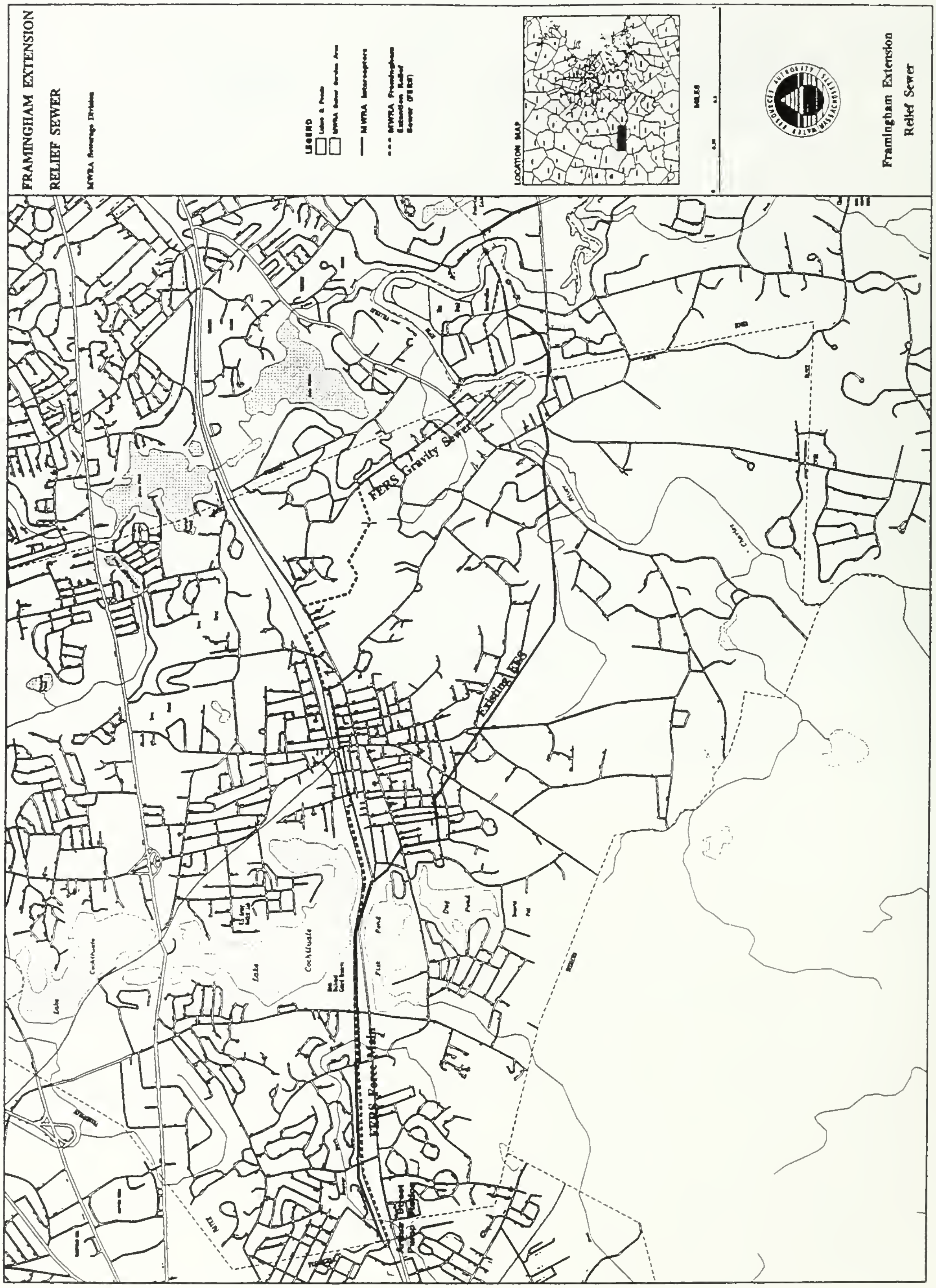
Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB Line Item	FY99	FY2000	FY2001	Description
Labor	$46,427	$0	$0	Two part-time electric operators to disinfect the plant and flush the force main.
Chemicals	$172,177	$26,277	($26,277)	Carbon absorption odor control system will be installed at the new Framingham Pump Station. Activated carbon will be replaced every other year. In addition, chemicals are required for hydrogen sulfide control along the Framingham Extension Sewer.
Utilities	$328,704	$0	$0	The new pump station is electrically operated.
Maintenance	$38,813	$61,668	$5,020	Instrumentation controls require extensive preventive maintenance.
Other	($5,902)	$0	$0	One time start-up expenses such as computers and office furniture are required at the new pumping stations.
TOTAL:	$580,219	$87,945	$21,257	

Expected start-up of Framingham Pump Station - June 1998 (FY98)



1106. Framingham Extension Relief Sewer
Interception and Pumping

1107. Cummingsville Replacement Sewer

Purpose

Capacity deficiencies in the MWRA system may be associated with overflows of local sewers upstream from the Cummingsville Branch System. In addition, sewer moratoriums are in effect in the upstream communities of Woburn and Burlington. Construction of a replacement sewer and rehabilitation of existing sewers will provide additional capacity to ensure adequate and reliable wastewater service for upstream communities.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Facilities Plan/EIR	$605	Jun 92	Jul 95
Design/CS/RI/Land Acquisition	$616	Nov 97	Nov 02
Construction	$3,018	Mar 01	Nov 02
TOTAL:	$4,239		

Project History and Background

The Cummingsville Branch Sewer System is located in the Town of Winchester and receives wastewater from sections of Winchester and Woburn and all of Burlington. The Cummingsville Branch Sewer System consists of the Cummingsville Branch Sewer, constructed around 1894, and the Cummingsville Branch Relief Sewer, constructed in 1952.

The existing system consists of 9,475 linear feet of 15- to 30-inch pipeline and has a flow capacity of 13 mgd. The 1975 Eastern Massachusetts Metropolitan Study recommended relief of the Cummingsville Branch Sewers to meet wastewater demand.

In 1988, MWRA informed local and state officials that the Cummingsville Branch Sewers would be on a priority list in any future sewer planning and design efforts.

In 1992, MWRA commenced facilities planning to study the adequacy of the system. Analysis of existing capacity and future expected flows resulted in identification of a system deficiency of approximately eight mgd. In addition internal television inspection of the existing sewers revealed cracks, infiltration, spalling, poor joint conditions, and root intrusion which compromise the structural and hydraulic integrity of these lines. Extensive evaluation identified the replacement of the Section 47 sewer with a new 36-inch gravity sewer as the preferred alternative. The replacement presents the fewest long-term environmental impacts, is the least expensive to construct and maintain, and renders unnecessary the extensive rehabilitation that would be required for this 100-year old sewer to remain in service.

The project also includes rehabilitation of the existing Section 86 and a small portion of Section 47 sewers to ensure their continued service.

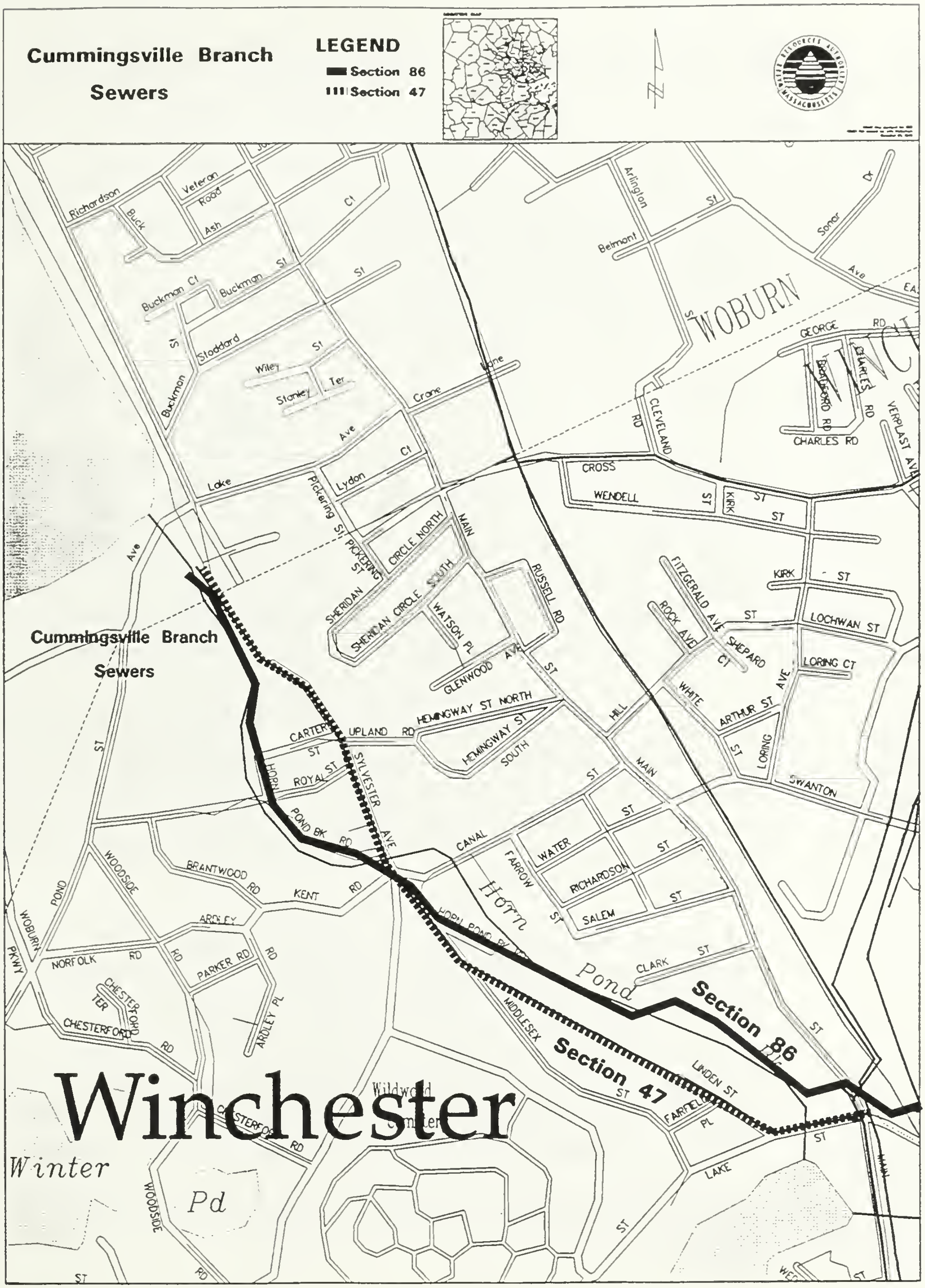
In November 1994, MWRA received notice from the Secretary of Environmental Affairs that an Environmental Impact Report (EIR) would not be required for construction of the new sewer.

Scope

Phase	**Scope**
Facilities Plan/EIR	Evaluate potential adverse impacts associated with additional flows downstream and recommend improvements to the system.
Design/CS/RI	Design for construction phase.
Land Acquisition	Land taking, easements, and litigation (as required) to facilitate construction.
Construction (new sewer) and Rehab of existing sewers	Replacement of the Section 47 sewer with a new 36-inch gravity line. Cleaning and repair of the existing Section 86 sewer, along with a small portion of Section 47 which will remain active to carry local flows.

Changes in Scope Since FY97-99 CIP None.

CEB Impacts None.



1107. Cummingsville Replacement Sewer
Interception and Pumping

1109. North Metropolitan Trunk Sewer Rehab (Phase II)

Purpose

To rehabilitate 19,700 linear feet of the 100 year old North Metropolitan Trunk Sewer (NMTS), which has internal deterioration. This rehabilitation will ensure that flows from the Caruso Pump Station in East Boston can be reliably transported to the Deer Island Treatment Plant.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design (In-House)	$0	Dec 92	Nov 95
Construction	$13,476	Aug 96	Aug 98
TOTAL:	$13,476		

Project History and Background

The NMTS, constructed in the 1890s, is a nine foot diameter, 25,000 linear foot brick sewer connecting the Ignatius Caruso Pumping Station in East Boston to the Deer Island Sewage Treatment Plant. The NMTS conveys dry weather sewage flows from East Boston, Chelsea, Revere, and Winthrop as well as overflows from the Chelsea Creek Headworks which are diverted to the pumping station during wet weather conditions.

Rehabilitation of portions of the NMTS was completed under a separate construction contract associated with the MWRA East Boston Pumping Station Facilities project. During construction-related internal inspections of the NMTS for this contract, it became apparent that the repair method identified for the specified segments of pipe was insufficient and that additional areas required rehabilitation. The areas, approximately 3,400 linear feet, suffering from the most critical structural damage and in need of emergency repair were rehabilitated under the East Boston Pumping Station Rehabilitation project.

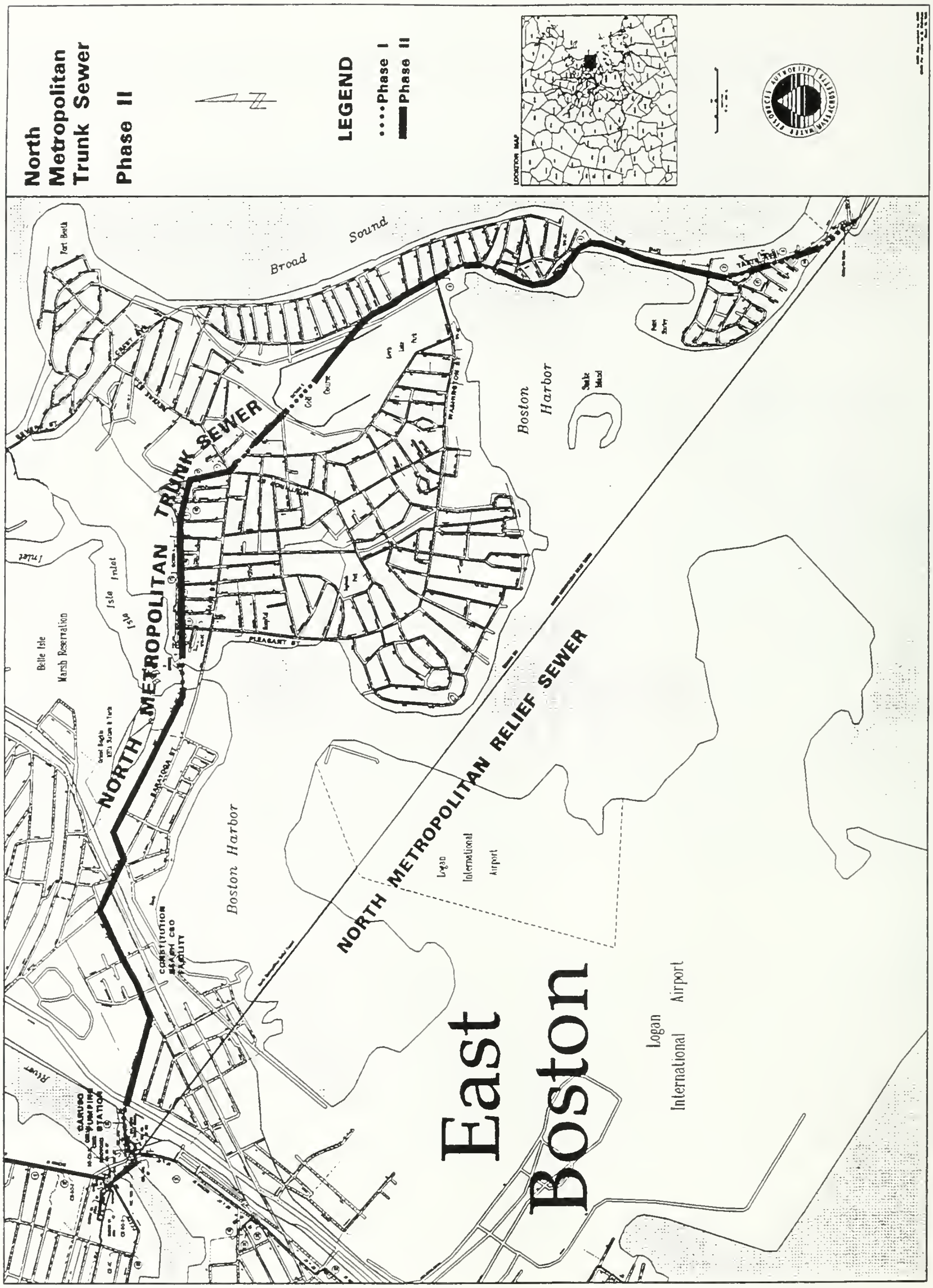
The MWRA will rehabilitate the remaining 19,700 linear feet of the NMTS under this project.

Scope

Phase	**Scope**
Design	In-house design of construction phase.
Construction	360 degree rehabilitation of 19,700 linear feet of the NMTS. Rehabilitation includes cleaning the sewer, placement of shotcrete with wire mesh, application an epoxy lining system in manholes only, sealing leaks with grout, and disposing of approximately 1,000 cubic yards of sediment and debris. Will use silica fume shotcrete coating in horizontal sections and epoxy coating in vertical chambers.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.


North Metropolitan Trunk Sewer
Phase II
LEGEND
Phase I
Phase II
LOCATION MAP
NORTH METROPOLITAN TRUNK SEWER
NORTH METROPOLITAN RELIEF SEWER
Broad Sound
Boston Harbor
Snake Island
Belle Isle Marsh Reservation
Belle Isle Inlet
Inlet
SARATOGA ST
PLEASANT ST
CONSTITUTION BEACH CSO FACILITY
CARUSO PUMPING STATION
River
Logan International Airport
East Boston

1109. North Metropolitan Trunk Sewer Rehabilitation (Phase II)
Interception and Pumping

1110. Siphon Chamber and Connecting Structure Rehabilitation

Purpose

Hydraulic flows through many siphon chambers and connecting structures throughout the MWRA sewage collection system are below design capacities. The poor flow conditions, caused by irregular maintenance due to the inaccessibility of many structures, contribute to significant surcharges and overflows. The detention time of wastewater at many structures also contributes to serious odor problems. A study is underway to evaluate rehabilitation of these structures to permit greater accessibility and provide regular maintenance in order to alleviate the above problems.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning	$660	Jan 96	Dec 97
Design/Land Easement	$1,410	Oct 98	Aug 01
Construction/Legal/Public Relations	$3,410	Feb 02	Jun 03
TOTAL:	$5,480		

Project History and Background

Siphon chambers are structures located at the upstream and downstream ends of depressed sewers. Depressed sewers are constructed to avoid obstructions in sewer alignments such as rivers and subsurface utilities. The upstream siphon chamber allows attainment of proper water elevation so that the depressed sewer flows under pressure. The downstream chamber provides transition between the depressed sewer and the downstream gravity sewer.

Connecting structures are facilities at which flows from sewers are redirected to converge with, or receive flows from, other sewers.

There are 92 siphon chambers and 111 connecting structures located throughout the North and South Collection systems. Of this total, 83 siphon chambers and 63 connecting structures have been identified for inclusion in the study phase of this project.

Scope

Phase	Scope
Planning	Identification of methods to improve accessibility, structural inspections of the siphon chambers and diversion structures, and recommendations for rehabilitation.
Land Acquisition	This phase will address costs related to acquiring construction and permanent easements.
Design	Design, engineering, and construction administration costs.
Construction	Construction at 110 sites.
Legal	Legal expenses associated with resolving construction and design issues or claims.
Easement	Expenses associated with gaining private property access during the planning phase.
Public Relations	Expenses associated with resolving technical issues with communities and site abutters arising from project implementation.

Changes in Scope Since FY97-99 CIP

Phase	Change
Design	New phase for FY98-00 CIP.
Construction	New phase for FY98-00 CIP.
Legal	New phase for FY98-00 CIP.
Easement	New phase for FY98-00 CIP.
Public Relations	New phase for FY98-00 CIP.

CEB Impact

None.

1111. Wastewater Metering System Upgrade

Purpose

MWRA must ensure that the community wastewater flow meter data used to calculate wholesale sewer charges is accurate, reliable, and defensible. Because the metering system was designed to allow for continual upgrade, existing meters may be relocated and additional ones may be added as needed. To ensure that at least 85 percent of flow in each community is metered, the Authority will add meters as needed in communities with less than 85 percent coverage, and replace some manhole meters with equipment at local pump stations.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design (In-house)	$10	Oct 94	Sep 96
Construction	$490	Apr 96	Jun 97
TOTAL:	$500		

Project History and Background

MWRA's final phase of the permanent wastewater metering system, completed in January 1994, consists of 212 meters operated and maintained by MWRA staff. The Authority uses data from the metering system for system planning, hydraulic modeling, quantification of I/I in community collection systems, and estimating each community's contribution to total wastewater flow. MWRA used flow data recorded during calendar year 1995 to calculate wholesale sewer rates for FY97 under its new rate methodology.

Scope

Phase	Scope
Design	Design phase will be performed in-house. The budget is for printing and permitting costs that support closure of the initial metering project and completion of the in-house design of system upgrades.
Construction	Addition of meters - Addition of 15 wastewater meters to upgrade metered flow coverage in those communities which currently have less than 85 percent coverage and for those communities which have an expected flow metering error greater than plus or minus five percent. Replacement of meters - Replacement of meters located at five manhole sites adjacent to local community pump stations with equipment directly connected to the pump stations. This type of meter installation has proven to be more reliable and requires less maintenance than manhole type installations.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

1112. Ashland Extension Sewer

Purpose

MWRA will study the feasibility of constructing an extension sewer from the Framingham Extension Relief Sewer to the Framingham/Ashland line. MWRA member communities that do not have direct connections to the MWRA sewer system have expressed concerns that their capacity for development may be negatively affected without these direct connections.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Design/Land Acquisition	$1,005	Sep 98	Mar 04
TOTAL:	$1,005		

Project History and Background

The Massachusetts Legislature added a requirement to the Commonwealth's FY96 budget that MWRA perform a feasibility study and design to extend the Framingham Relief Sewer to the boundaries of contiguous member communities. There are concerns that by not having direct connection to the MWRA sewer system, a community's development may be negatively affected.

The selected design consultant will evaluate the effect of the new flows on Ashland's sewerage system and MWRA's Framingham interceptor, will assess the need for construction of a new sewer and auxiliary pumping facilities, and will evaluate environmental and community impacts.

At this preliminary stage, the alignment of the project has not been finalized. The proposed project will commence at the Framingham/Ashland town line and will tie into the MWRA's Framingham Extension Relief Sewer (FERS) interceptor at the Arthur Street DPW yard in Framingham.

Construction costs may vary depending on whether existing facilities can be modified to meet the hydraulic requirements, or whether new construction will be required.

Scope

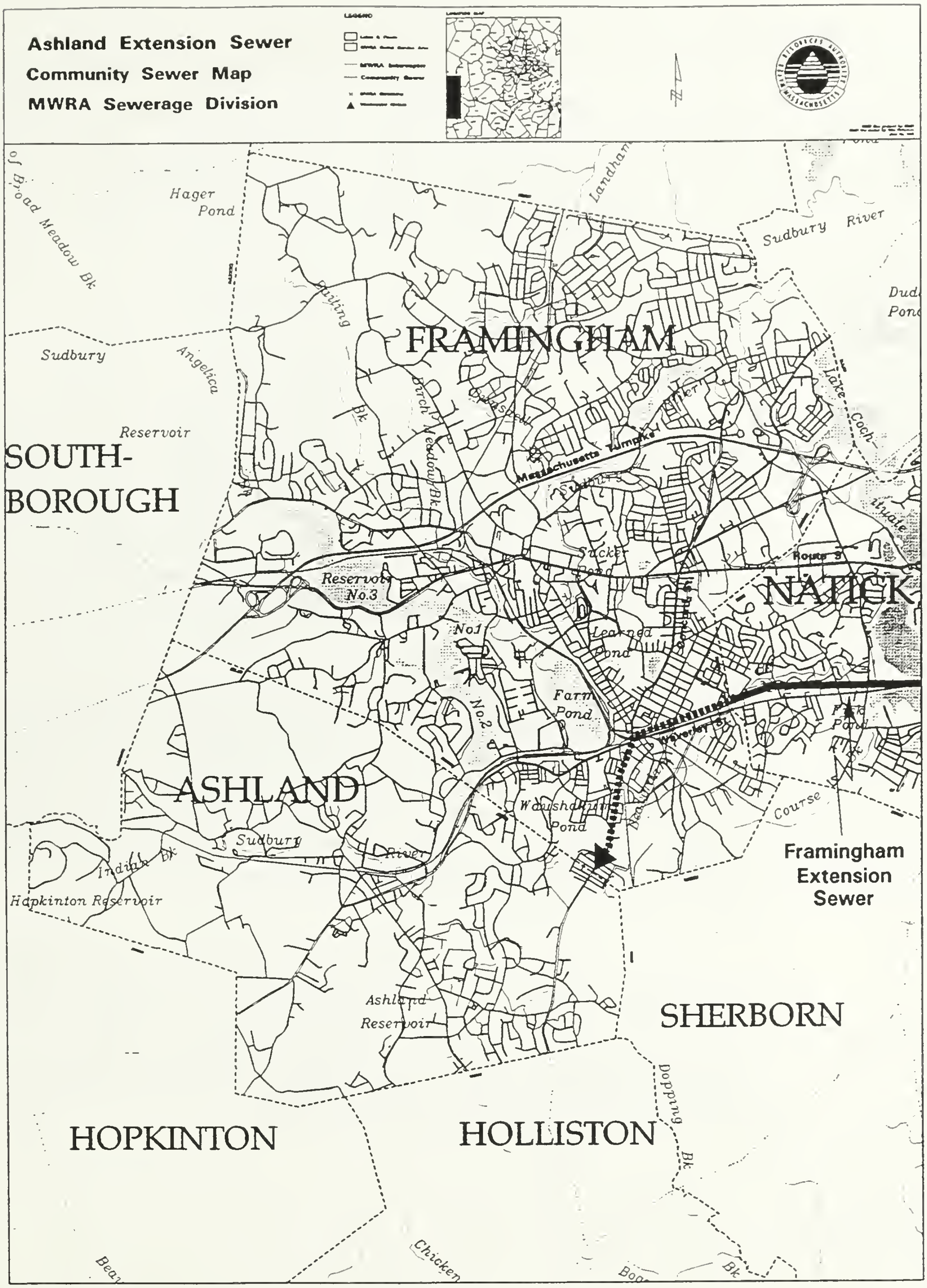
Project	Scope
Planning/Design	Conduct a feasibility study, analyze costs, and if necessary, prepare designs for projects necessary to extend the Framingham Relief Sewer into the Town of Ashland.
Land Acquisition	Project may require access to private property during the planning phase.

Changes in Scope since FY97-99 CIP

Project	Change
Land Acquisition	New phase for FY98-00 CIP.

CEB Impact

Not available.



1112. Ashland Extension Sewer
Interception and Pumping

1113. System Master Plan (SMP) Interceptors

Purpose

Hydraulic capacity deficiencies exist for five interceptor sewers during peak flow conditions. As a result, surcharging occurs and negatively affects tributary communities. The project will reduce surcharging by rehabilitating or replacing the five interceptors, if necessary, which comprise this project. They are: Mystic Valley, Revere Branch, Neponset Valley, Cambridge Branch, and Malden Branch.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Design	$2,593	Sep 97	Oct 02
Construction	$16,205	Dec 03	Dec 05
TOTAL:	$18,798		

Project History and Background

The Final CSO Conceptual Plan and System Master Plan (SMP), published in December 1994, recommended that the MWRA proceed with 13 Priority A and B projects. Priority A was defined as conduits that surcharge to within six feet of the ground surface or contribute to sanitary sewer overflows. Priority B was defined as conduits that surcharge, but where hydraulic grade line is predicted to be six feet or more below the ground surface. This project includes facilities planning, and capital improvements as necessary, for three Priority A conduits, and two Priority B conduits.

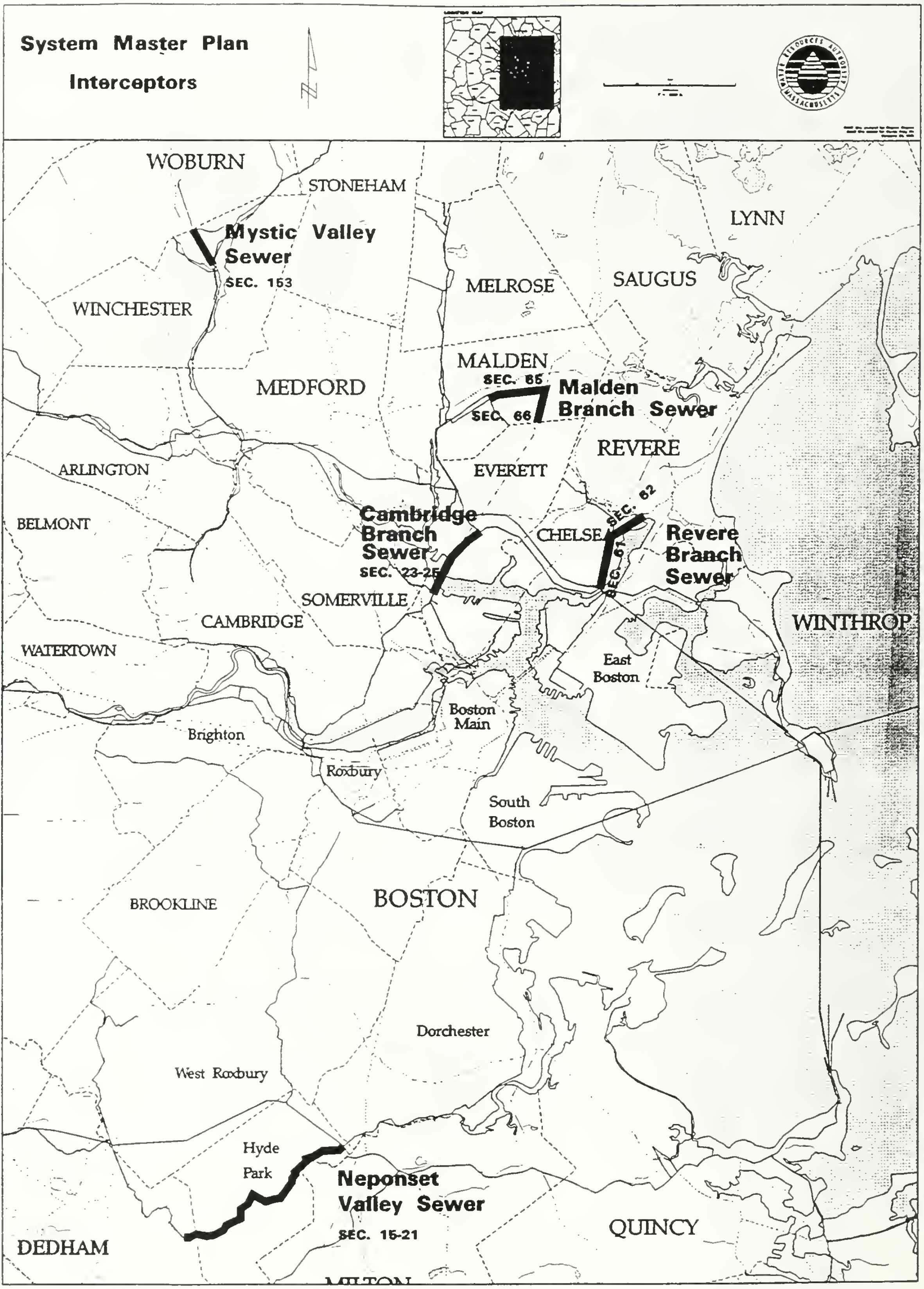
The SMP Interceptor project includes the preparation of one facilities plan/environmental impact report for the upgrade of five interceptor systems. Based on the surcharging conditions, a hydraulic capacity deficiency exists for each of the interceptor sewers during peak flow conditions. A facilities plan will recommend design alternatives for each of the five interceptors as a follow-up to the initial findings of the CSO System Master Plan.

Scope

Project	Scope
Planning/Design	Planning and Design of five interceptor construction contracts.
Construction: Mystic Valley Sewer Section	Replacement of 4,250 linear feet of the existing 1.25 foot diameter sewer located on the upper end of the Mystic Valley Sewer in Woburn, with a two foot diameter sewer.
Construction: Revere Branch Sewer Section	Installation of 3,112 linear feet of 4.5 foot diameter relief sewer parallel to the existing four foot diameter sewer. Installation of 3,500 linear feet of four foot diameter sewer parallel to the existing four foot diameter sewer. Sections 61 and 62 extend from the Chelsea Screen House in Chelsea along Eastern Avenue and Crescent Avenue, essentially to Mill Creek in Revere.
Construction: Neponset Valley Sewer Sections 15 through 21	Replacement of 17,300 linear feet of existing 48 inch by 50 inch through 54 inch by 56 inch with a new 54 inch, 56 inch, 60 inch, and 66 inch diameter sewer. The sewer runs along River Street to Business Street, crosses the railroad tracks, and parallels Neponset River back onto River Street.
Construction: Cambridge Branch Sewer Sections 23 through 25	Installation of 4,935 linear feet of six foot diameter relief sewer parallel to the existing 6.76 foot diameter sewer. The interceptor branches out from the North Metropolitan Sewer, extends along Route 99 to the Charlestown Pumping Station.
Construction: Malden Branch Sewer Sections 65 and 66	Replacement of 2,630 linear feet of existing 1.5 foot diameter sewer with a new two foot diameter sewer. The existing sewer runs along Route 99 between Taylor and Salem Streets.

Change in Scope since FY97-99 CIP None.

CEB Impact None.



1113. System Master Plan Interceptors

Interception and Pumping

1114. Corrosion and Odor Control Study

Purpose

High sulfide levels in the Framingham Extension System are believed to be the cause of corrosion and odors in that system and downstream in the Wellesley Extension Sewer System. These elevated sulfide levels generate odors and cause corrosion of the pipe which affects the structural integrity of pipes and pump stations as well as community relations. The study will identify the causes and sources of odors and recommend corrective measures. It will also provide detailed information about the local sewers in Ashland and Framingham, which will be used in assessing the feasibility of the Ashland Extension Sewer Project.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End Date
Planning/Study	$685	Oct 96	Feb 98
TOTAL:	$685		

Project History and Background

MWRA is aware of the problems caused by sewer odors produced by hydrogen sulfide, both as they affect the structural integrity of pipes and pump stations, as well as community relations. Recent collapses in the Framingham Extension Sewer (FES) have alerted staff to problems in that area. Odor complaints have been received from residents abutting both the FES and the Wellesley Extension Sewer (WES) systems resulting in the settlement of legal claims totaling several hundred thousand dollars.

This situation prompted staff to experiment with adding odor control chemicals at various points in the local systems and FES to try to reduce the levels of odor due to hydrogen sulfide. The results were mixed; not all of the chemicals were effective even over the short range, and none were capable of eliminating hydrogen sulfide completely through the length of the FES. Chemicals used have included potassium permanganate, hydrogen peroxide, two types of calcium nitrate, and ferrous chloride, with costs ranging from $1,000 to $2,000 per day.

While MWRA attempts to minimize odor impacts through chemical intervention and sealing locations where odors escape, a more permanent solution is being sought. MWRA believes that high sulfide levels in the FES system are a major contributing factor to the corrosion and odors existing both in the FES and downstream in the WES system. There is speculation that the sulfide levels originate in the municipal tributary sewerage systems and transfer into MWRA's interceptors.

Scope

Project	**Scope**
Planning/Design	Identify causes and sources of odors; collect local sewer system information in Ashland, Natick, and Framingham; recommend long-term corrective measures.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

The recommendations from this study may result in changes to operating and maintenance practices. Staff will assess the CEB impact of these recommendations as the study progresses.

1115. Wastewater Facilities Rehabilitation

Purpose

MWRA has recognized the continuing need for a systematic approach to maintaining its existing wastewater facilities. Systematic repairs and rehabilitation are critical to ensuring the safe and efficient operation of these facilities, and to avoiding the greater capital costs of complete replacement of badly deteriorated facilities.

This project consists of two phases designed to meet this need. The first phase will include the development of a formal procedure for the annual evaluation of each wastewater facility, comprehensive inventory, and evaluation of capital needs for an initial group of facilities. The second phase includes the design and construction of priority capital improvements.

MWRA engineering and operations staff are coordinating current rehabilitation projects with those identified under this project. All rehabilitation will be incorporated into the baseline information for each facility.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Inventory and Evaluation	$1,532	Sep 97	Feb 02
Design and Construction	$1,732	Oct 99	Jan 05
TOTAL:	$3,264		

Project History and Background

The Sewerage Division Plan evaluated the condition of the Division's interceptors and facilities, and identified general maintenance and rehabilitation needs. The Wastewater Facilities Rehabilitation project will focus in greater depth on 25 facilities, including six CSOs, 11 pumping stations, five headworks, the Clinton Wastewater Treatment Plant, and two miscellaneous structures. As part of this study, a comprehensive facility inventory will be compiled and subsequently used by staff for both short- and long-term maintenance planning.

The 25 facilities will be divided into several groups based on the age and condition of each. Older facilities will be inventoried and evaluated first. New and recently rehabilitated facilities will be analyzed in subsequent years. Facilities which are planned to be abandoned will not be included in this project. The inventories and evaluations of these facilities will be phased over a period of six years. Staff will use the comprehensive facilities inventories to assess the condition of each facility, and identify immediate and future maintenance needs.

Scope

Project	Scope
Inventory and Evaluation	Produce a comprehensive inventory (building components and equipment) of each of the division's 25 facilities one group at a time, and identify inadequacies requiring attention within the next six years.
Design and Construction	Design and construction for rehabilitation of each group of facilities evaluated.

Changes in Scope Since FY97-99 CIP

Project	Change
Inventory and Evaluation	Increased to provide funds for evaluation of facilities beyond FY99.
Design and construction	Increased to provide funds beyond FY99 for design and construction of rehabilitation projects identified during evaluation phase.

CEB Impact

CEB line item	FY00	Description
Maintenance	$300,000	The recommendations from each phase of this study may include maintenance projects appropriately funded through the CEB. Also, the level of maintenance and rehabilitation is expected to increase after five years as facilities age.
TOTAL:	$300,00	

1116. West Roxbury Tunnel Study

Purpose

To conduct a study of the condition of the West Roxbury Tunnel sewer. This sewer, which was built in 1964, transports flows from the Wellesley Extension Relief Sewer System through the West Roxbury portion of the City of Boston to the high level sewer. A structural failure in Section 137 could negatively impact the tributary communities through increased surcharging and overflows.

Following the investigation of Section 137 through video and visual inspections, a consultant will provide recommendations and costs for rehabilitation, if necessary.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Inspection/Engineering Report	$215	Jul 97	Feb 98

Project History and Background

During the construction of the Wellesley Extension Sewer Replacement (WESR) Project, visual observations by MWRA's resident inspector indicated that severe corrosion had occurred in a portion of the Wellesley Extension Relief Sewer (WERS) directly upstream of the West Roxbury Tunnel (WRT). That report indicated that sections of the pipe and tunnel entrance structure had lost cement lining exposing the reinforcing steel. Manholes and other structures have been affected more severely.

A structural failure of the WRT would impact the tributary communities of Ashland, Brookline, Dedham, Framingham, Natick, Needham, Newton, Wellesley, and the Hyde Park and West Roxbury portions of the City of Boston. Local failure of the tunnel could result in 53 to 128 mgd of raw sewage discharging into the Charles River until emergency repairs could be made. Depending on the location of the failure, this volume of sewage may back-up into local residences and businesses. In addition, service to 125,000 people would be interrupted since there is no redundant line with adequate capacity. The West Roxbury Tunnel also crosses beneath the VFW Parkway, Washington St. and a Conrail line. Structural failure beneath any of these major transportation corridors would result in a severe public safety hazard.

Failure to promptly rehabilitate corroded portions of the WRT will result in increased long-term capital costs, as corrosion will continue and result in more extensive and costly repairs. The longer MWRA waits to rehabilitate the tunnel while additional corrosion occurs, then more costly rehabilitation or replacement methods will be required. Corrosion occurs exponentially, particularly after exposure of the reinforcing steel. Corrosion in the tunnel has been visually verified twice, first in 1984, and then in 1992.

Since the problem is structural, any CSO or I/I recommendations will not affect the need for this project.

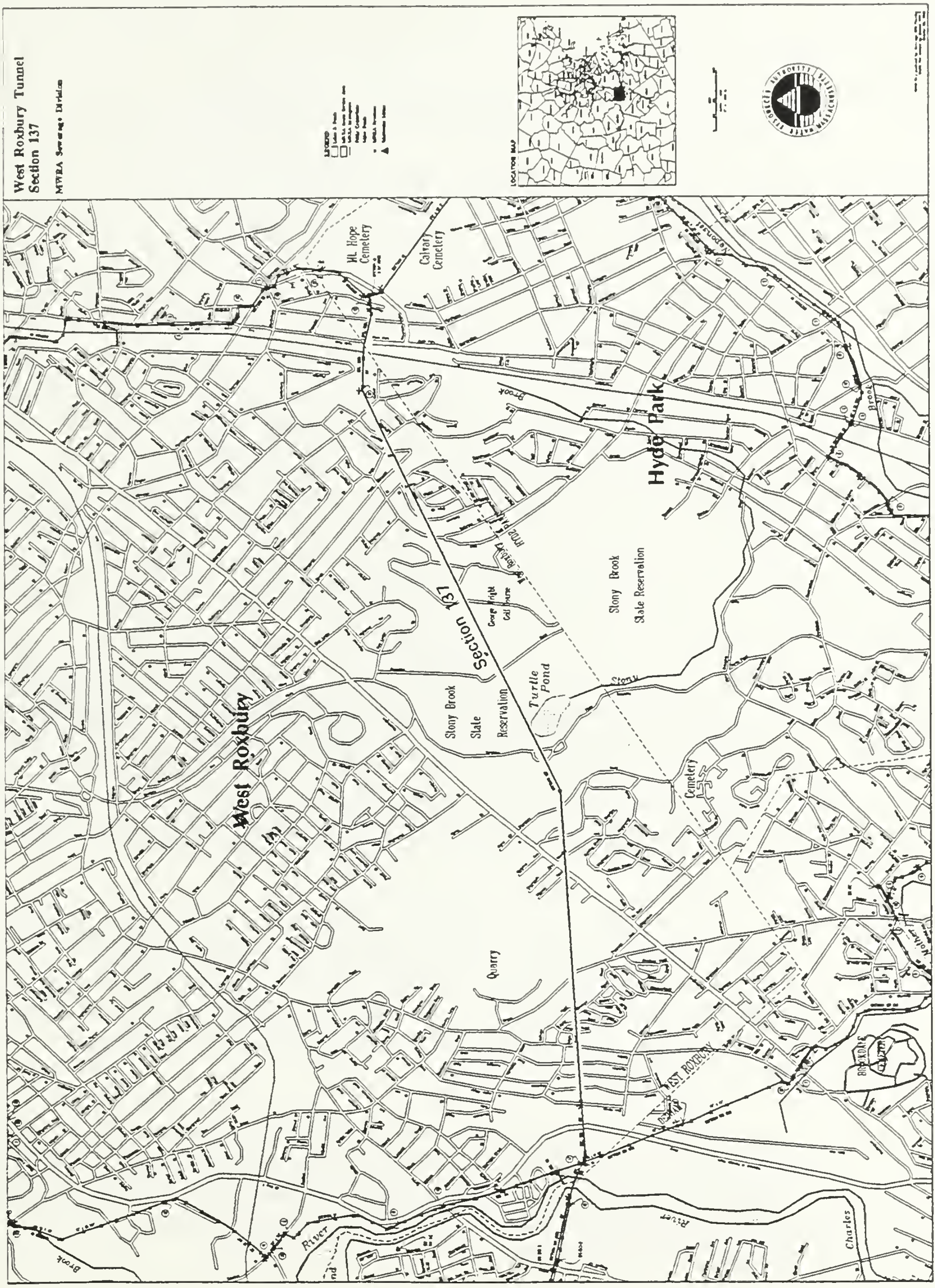
Scope

Project	**Scope**
Inspection	Inspect Section 137 of the West Roxbury Tunnel. Includes 12,500 linear feet of 84 inch reinforced and unreinforced concrete tunnel.
Engineering Report	Evaluation of Section 137 of the West Roxbury Tunnel, including the development of recommendations and cost estimates for addressing structural deficiencies identified during inspection.

Changes in Scope since FY97-99 CIP

Project	**Change**
West Roxbury Tunnel Study	New project for FY98-00.

CEB Impact None.



1116. West Roxbury Tunnel Study
Interception and Pumping

1117. Wastewater Central Monitoring and Operations

Purpose

To study the feasibility of implementing an automated system that will allow MWRA staff to monitor and control the operation of the Wastewater Transport System from a centralized location. Transport Facilities are currently operated independently by on-site operators. MWRA does not currently possess the centralized ability to gather, analyze, and respond to transport system performance information, or the ability to remotely implement synchronized responses to problem situations. The study will recommend a phased cost effective approach to implementing this system.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Planning	$600	Nov 97	Nov 98

Project History and Background

Wastewater Transport Facilities, such as pump stations and screening facilities, are currently operated independently by on-site staff. This mode of operation does not provide MWRA with centralized and instantaneous system performance information, nor the ability to remotely implement a synchronized response to a problem situation. Without a centralized system, personnel are dispatched to unstaffed facilities as needed and the operation of the facilities are coordinated via telephone and radio.

In addition to optimizing the performance of the existing Transport System, a central monitoring system may provide maintenance staff with information on the operating characteristics (e.g. vibration level, temperature) of key pieces of equipment within each facility. This data will allow maintenance staff to schedule and perform preventive maintenance, thereby reducing service disruptions and more costly repairs.

By implementing system-wide remote monitoring and control, the Sewerage Division may also be able to reduce operational staffing requirements of Transport Facilities. As part of the Facilities Maintenance Benchmarking Project, Sewerage Division staff visited a wastewater district with a monitoring system in place similar to that proposed for MWRA.

From the visit, staff concluded that by not staffing remote facilities, more staff resources may be made available for maintenance functions, resulting in a more extensive overall maintenance program.

The proposed FY98-00 CIP budget includes funds for the first phase of this project. The scope includes defining Wastewater Transport's needs, analyzing alternatives, and developing a recommended implementation plan.

Scope

Project	Scope
Planning	Examine the current operations and deficiencies; identify and evaluate engineering and central monitoring technology alternatives, and recommend a solution and implementation plan.

Changes in Scope since FY97-99 CIP

Project	Change
Central Monitoring and Operations	New project for FY98-00.

CEB Impact The Sewerage Division will develop these costs for inclusion in the Final FY98-00 CIP.

1201. Remote Headworks Rehabilitation

Purpose

Improvements are necessary to the three remote headworks to ensure effective operation, safe working conditions for employees, and to extend the useful life of these facilities.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/RI/Construction Services	$231	Nov 94	Oct 96
Construction	$3,130	Jul 93	Jun 98
Technical Assistance	$93	Jul 93	Apr 97
TOTAL:	$3,454		

Project History and Background

The remote headworks are located at Chelsea Creek in Chelsea, Columbus Park in South Boston, and Ward Street in Roxbury. These facilities provide pretreatment of the North System's sewage prior to its entering the Deer Island tunnel system. The three headworks facilities were built in the 1950s and 1960s. Rehabilitation in 1987, did not address all the problems at the headworks.

Improvements are necessary due to the following conditions:

- Exterior paving is in need of repair due to cracking, pot holes, and improper sloping for drainage (completed).
- The headworks tile floors are worn and have missing and uplifting tiles which create safety hazards (completed).
- Suspended ceiling panels are broken, stained, or missing (completed).
- The grit hoppers have become corroded and are no longer capable of safely storing grit (in construction).
- The emergency generators are undersized for the operation of new equipment installed during the 1987 rehabilitation, and cannot provide enough power to operate the HVAC systems during electrical shutdowns (in design).
- There are no toilet and locker facilities for female employees (in construction).

- Lack of proper ventilation is a safety hazard to employees (completed; part of Deer Island fast track improvements in 1990).
- The gratings at all three facilities are either loose, bent, or twisted, creating tripping hazards (in construction).
- Most of the guard rails are only 37 inches in height, which is lower than the standard 42-inch rail height required by the Occupational Safety and Health Act (in construction).
- The freight elevators have been in use for more than 20 years and are in need of repair to ensure safety and compliance with current Massachusetts codes (in design).

Scope

Phase	**Scope**
Rehabilitation Design/CS 1	Design and construction services for Rehab-Construction 1 phase.
Rehabilitation-Construction 1	Installation of new paving at Columbus Park and Ward Street, new suspended ceiling systems at the Chelsea Creek and Ward Street facilities, and new tile flooring in the operations room, lunch areas, and locker rooms at the Chelsea Creek and Columbus Park facilities.
Rehabilitation-Design 2/RI	Design for Rehab-Construction 2 phase.
Rehabilitation-Construction 2	Installation of direct discharge piping to RO/RO containers.
Rehabilitation CS/RI 2	Construction services and resident inspection for Rehab-Construction 2 phase.
Rehabilitation Design 3	Design for Rehab-Construction 3 phase.
Rehabilitation Construction 3	Installation of properly-sized generators, switchgear, and transfer switches; construction of female locker, shower, and restroom facilities; and replacement of grating and railings at all three facilities.
Rehabilitation CS/RI 3	Construction services and resident inspection for Rehab-Construction 3 phase.
Technical Assistance	Technical Assistance was provided for emergency generators, female locker facilities, grating, and guard rails.
Elevator Rehab-Design	Design for Elevator Rehab-Construction phase.
Elevator Rehab-Construction	Freight elevator shaft repairs and replacement or modification of the head house structure, operating mechanism, controls, and cab.

Changes in Scope Since FY97-99 CIP	None.

CEB Impact	None.

1202. Boston Harbor Performance Certification

Purpose

Performance certification for the Boston Harbor Project (BHP) is required by funding agencies to maintain project eligibility for federal and state grant and loan programs. As defined by this project, operational Phase I of the BHP was completed in FY96; written certification for this phase must be complete by the end of FY97.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Phase I	$600	May 96	Aug 97
Phase II	$600	Mar 98	Jun 99
Phase III	$300	Jun 00	Aug 01
TOTAL:	$1,500		

Project History and Background

Performance certification, an independent evaluation of a project's ability to satisfy specific performance standards, is generally a requirement of state and federal grant funding and loan programs. If the facilities meet performance standards, they are certified. If the facilities do not meet performance standards, corrective action is required before the final release of grant funds. Certification of the new Deer Island Treatment Plant's performance will furnish the MWRA with an independent evaluation of the equipment and system's ability to function as designed. It will also give extra assurance that the design, construction, and operation have interfaced effectively to produce a functional plant.

The BHP consists of many interrelated projects that cannot be evaluated independently. Therefore, evaluation will be performed on groups of projects after they have reached substantial completion and have operated for a period of time. Certification will be performed over three operational phases by a single, independent consultant using data generated by the Deer Island Treatment Plant, Environmental Quality Department, Lead Design Engineer, Project Design Engineer, Construction Manager, and the selected consultant.

Scope

Phase	Scope
All Phases	Provide expert, unbiased evaluation of the new Deer Island Treatment Plant's operating performance during and following each defined operational phase. Provide project certification when performance standards are met. Assist in the development of any corrective action plan deemed necessary. Provide reports and back-up data to support conclusions.

Changes in Scope since FY97-99 CIP

Phase II	Expansion of scope due to shifting of CPs from Phase III to Phase II.
Phase III	Decrease in scope due to shifting of CPs from Phase III to Phase II.

CEB Impact

CEB Line Item	FY99	Description
OTHER	$200,000	Will cover materials and services required to address problems identified during performance certification process.

Ongoing Deer Island Capital Improvements

Purpose

The purpose of this sub-category of projects within Wastewater Treatment is to ensure the proper and efficient operation of the new Deer Island Treatment Plant, meet regulatory requirements, and protect the new facility's assets. MWRA is establishing this project sub-category in the proposed FY98-00 CIP because several phases of the $3.6 billion Boston Harbor Project will be complete and operational by the end of FY97. Specific projects within this sub-category will provide for technological or operational improvements, rehabilitation or repairs, equipment replacement, or protection of plant assets.

Expenditure Forecast and Schedule

Project	Total Contract Amount $(000)	Begin date	End date
Deer Island Treatment Plant			
As-Needed Design/CS/RI	$500	Oct 97	Oct 99
Construction Services Contracts	$1,500	Dec 97	Dec 00
On-Site Sodium Hypochlorite Plant	$16,650	Dec 97	Jun 99
Coastal Protection	$0	TBD	TBD
Plant-Wide System	$250	Oct 97	Apr 99
Total	$18,900		

Project History and Background

Construction of the $3.6 billion Deer Island Treatment Plant is currently administered by the Program Management Division as part of the Boston Harbor Project. Following completion and acceptance of a facility or a construction package by MWRA, the responsibility for operating the facility transfers to the Sewerage Division. To ensure proper and efficient operation of the facility placed into service, new projects may be needed for technological or operational improvements, rehabilitation or repairs, and general protection of the plant's assets.

The following set of projects will provide an array of services and capital improvements necessary to support the transition from initial construction. Deer Island management will use these services to complete unanticipated, emergency, or high priority repair, modification, or maintenance projects at the new Deer Island Treatment Plant which meet CIP policy guidelines for capital projects.

To date, $1 billion in wastewater treatment facilities have been placed into operation. On January 20, 1995, MWRA introduced wastewater into the first two primary treatment batteries (A and B) of the new plant. The remaining two primary treatment batteries (C and D) were completed in July 1995 and placed into service in September 1995.

In late July 1995, the first module of the new residuals treatment facilities was completed and steps to begin operation initiated. Transition to the new residuals complex proceeded more quickly than anticipated and it was in full operation by mid-August. At this point, the residuals facilities of the existing plant were taken off-line; the interim connection to the new plant was severed; and full-scale demolition of the existing plant could proceed. The second module of the residuals facilities was completed in November 1995 and turned over to DITP.

The first two of the three chemical storage tanks were completed and placed into operation in June 1995, and the interim storage tanks used to support the January plant start-up were removed. The third storage tank was completed in July 1995. The disinfection basins in the Phase II disinfection facilities (CP-241) were completed and placed into operation on December 15, 1995. The basins improve disinfection by increasing contact time with the sodium hypochlorite solution before the effluent is discharged and may enable DITP to reduce chemical use.

After cut-over of the cross harbor cable from the interim substation to the permanent substation in October 1994, the 18 portable generators remained on-site to serve as the back-up power source for both the new plant and ongoing construction activity. In May 1995, the combustion turbine generators (CTGs) had been installed and sufficiently tested to serve as the permanent back-up power source, and the temporary generators were removed. Performance testing was completed in August 1995, and the CTGs were turned over to DITP.

1206. Deer Island As-Needed Design/Construction Services/Resident Inspection

Purpose

The purpose of this project is to provide Deer Island staff with as-needed design and resident inspection services primarily to support emergency, unanticipated, or high priority projects to be constructed via construction support contracts (CSCs).

In tandem with the CSCs, this project will provide DITP management with the flexibility to complete design and construction of critical and high priority projects on a timely basis.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Design/CS/RI	$500	Oct 97	Oct 99

Scope

Project	Scope
Design/CS/RI	The use of consultant resources in a variety of engineering and construction disciplines to complete critical and high priority projects.

Project History and Background

Modifications required during the course of BHP construction work are typically addressed through either change orders to the active contracts or warranty claims whereby the contractor is responsible for rectifying existing problems. However, most modifications required after the MWRA has accepted a facility are ineligible for funding through these methods due to procurement laws or warranty limitations. This project will provide a mechanism for completing critical and high priority modifications which are outside the scope of change orders or warranties. Please also refer to the Project History and Background section of the next project, Deer Island Construction Services Contracts.

Changes in Scope since FY97-99 CIP

Project	Change
DI As-Needed Design/CS/RI	New project for FY98-00.

Change of Scope None.

CEB Impact None.

1207. Deer Island Construction Services Contracts

Purpose

This project will provide an array of on-call construction services. Deer Island management will use these services to complete unanticipated, emergency, or high priority repair or modification projects at the new Deer Island Treatment Plant. Staff will only use these resources to address plant operations or maintenance issues due to:

- problems that require immediate attention in facilities accepted by MWRA and under the operation of the Sewerage Division;
- problems or projects that have been identified after the first year of operation by MWRA;
- problems identified as a warranty-related matter that the contractor refuses to address or delays in addressing; and,
- MWRA-determined design changes that will result in operational benefits.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Construction	$1,500	Dec 97	Dec 00

Project History and Background

The new Deer Island Treatment Plant, the centerpiece of the Boston Harbor Project, consists of an extensive infrastructure of facilities and utility services. Due to the size, scope, and complexity of the BHP, it is inevitable that unanticipated repairs and/or modifications to various facilities and utilities will be necessary following substantial completion and eventual turnover of the capital asset to the Sewerage Division. These contracts are not intended for use in addressing routine and anticipated plant operations and maintenance.

In FY96, MWRA approved construction repair contracts for electrical, heating, ventilation, and air conditioning (HVAC), plumbing, and site work services. These contracts allowed Deer Island management to immediately address start-up related repairs, corrections, modifications or alterations necessary to ensure optimum performance and operation of all facilities that were turned over to and accepted by the Sewerage Division. In FY96, MWRA funded these contracts through CEB reallocations and the Deer Island Operating Reserve.

However, given the ongoing need for these types of contracts through the start-up of full secondary treatment in FY2001, it was determined that these services are appropriate capital budget expenses, and are therefore included in the proposed CIP.

Scope

Project	Scope
Construction - HVAC	Provide construction labor to address heating, ventilation, and air conditioning (HVAC) issues.
Construction - Plumbing	Provide construction labor to address plumbing issues.
Construction - Electrical	Provide construction labor to address electrical issues.
Construction - Site Work	Provide construction labor to address site work issues.

Changes in Scope since FY97-99 CIP

Project	Change
D.I. Construction Services	New project for FY98-00.

CEB Impact

None.

1208. On-Site Generation of Sodium Hypochlorite

Purpose To build a facility on Deer Island to generate sodium hypochlorite. On-site generation appears to offer a less expensive and more reliable alternative to purchasing the chemical through a multi-year contract.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Design/CS/RI	$2,323	Dec 97	May 98
Construction	$14,327	Jan 99	Jun 99
Total	$16,650		

Changes in Scope since FY97-99 CIP

Project	Change
On-Site Generation of Sodium Hypochlorite	New project for FY98-00.

Project History and background Sodium hypochlorite is the primary chemical used in the disinfection and odor control processes at the Deer Island Treatment Plant. Several years ago, Deer Island experienced a serious interruption in sodium hypochlorite delivery services when the vendor encountered barging difficulties.

During this two week interruption, Deer Island management arranged on an emergency basis for delivery of sodium hypochlorite via trucks, thus exceeding the limits in MWRA's MOU with Winthrop regarding the number of trucks and cargo allowable through Winthrop to D.I. In the future, severe weather in the Boston Harbor could again hinder the delivery of this vital chemical and thus jeopardize the ability of the DITP to meet permit requirements unless the Authority has the capability to produce sodium hypochlorite on-site.

In 1994, Deer Island staff began a study of the feasibility and cost-effectiveness of on-site generation of sodium hypochlorite. This study, which has progressed through several phases, included review of various technologies for generating sodium hypochlorite and an analysis of the costs and issues associated with each technology. Staff have also completed life cycle cost analyses (LCCA) for numerous scenarios, primarily to account for a range of assumptions for production volumes, energy prices, useful life of the facility, and potential changes in regulations regarding disinfection.

The results of the most recent LCCA for this project indicate that on-site generation of sodium hypochlorite is less expensive long-term than purchasing the chemical through a multi-year contract. Also, the new generation facility will ensure that sodium hypochlorite will be consistently available for use in the treatment process.

CEB Impact

Line Item	FY2000	FY2001	Description
Labor	$69,653	$23,057	Staffing at new plant.
Chemicals	(3,629,523)	(1,209,841)	Reduced costs related to the purchase of Sodium Hypochlorite.
Electricity	1,222,020	407,340	Cost to operate new plant.
Maintenance	489,188	163,062	Cost to maintain new plant.
Other	35,700	11,900	Miscellaneous operating costs.
Total	($1,812,962)	($604,482)	

Please note: The above CEB Impact is also incorporated in Deer Island's CEB Impact section.

1209. Deer Island Coastal Protection

Purpose

Pursuant to the Massachusetts Wetlands Protection Act, MWRA is required to ensure coastal protection of Deer Island. This includes restoring any shoreline area damaged by the construction of the seawall and revetments, structures designed to limit the DITP's exposure to adverse weather.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Coastal Protection	$0	To be determined as needed	

The range of costs for restoring the shoreline, if required, is currently estimated between $1 and $3 million per incident.

Project History and Background

As part of the Boston Harbor Project, seawalls and revetments will be constructed to limit the new Deer Island Treatment Plant's exposure to adverse weather conditions. Per the Massachusetts Wetlands Protection Act, MWRA is responsible for restoring any shoreline area damaged during the construction of seawalls and revetments.

To quantify the construction impacts, MWRA will survey the shoreline prior to construction to develop a baseline and benchmarks for comparison with post-construction conditions.

The beach areas to be considered include the following: the northeastern shoreline affected by the CP-204 seawall and the CP-043 revetment, and the southeastern shoreline adjacent to the CP-301 seawall. Annual surveys of these areas include vertical aerial photography of the eastern and northern shores, developing profiles based on beach measurements, and obtaining storm effect data from the National Weather Service and town and newspaper.

Two, five, and ten years from the pre-construction survey, a consultant will determine the extent of beach erosion, if any. If erosion has exceeded any thresholds set for the beach areas, then the beach will be restored back to the baseline level. The restoration limits extend from the seawall or revetment down to mean low water (MLW) or mean seal level (MSL).

Scope

Project	Scope
Coastal Protection	Restore Deer Island shoreline, if damaged by the construction of the seawall and revetments.

Changes in Scope since FY97-99 CIP

Project	Change
Coastal Protection	New project for FY98-00.

CEB Impact

Operating expenses include annual pier dredging and beach surveys, as required by regulatory agreements. The Sewerage Division will develop these costs for inclusion in the Final FY98-00 CIP and the FY99 CEB.

1210. Deer Island Plant-Wide System

Purpose

The current method for evaluating mechanical failures or preparing for equipment down time at the Deer Island Treatment Plant is time consuming. Information from many paper references must be collected and reviewed in order to obtain a complete understanding of mechanical and system interdependencies.

By regrouping data, a plant-wide computer system will allow plant engineers to more efficiently facilitate the repair and maintenance of mechanical systems. The plant-wide system under consideration will provide immediate access to important drawings, and related documents at the personal computers of the engineering, operations, and maintenance staff.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Design Information System Center (DISC) Application	$250	Oct 97	Apr 99

Project History and Background

Staff-originated documents, in various stages of revision, are normally required for reference when performing maintenance, repairs, replacements, or modifications at the Deer Island Treatment Plant. The gathering and review of these documents is critical in developing a complete picture of mechanical and system interdependencies.

This data collection process is time consuming and affects the response rate of resolving mechanical failures at the DITP.

A plant-wide system will allow staff to immediately access important drawings and related documents on personal computers in Engineering, Operations, and Maintenance. Access to such a system reduces the requirement of possessing expertise in one particular area of the plant, expeditiously identifies system or equipment relationships, and accounts for and controls all work performed.

Scope

Project	Scope
DISC Application	Provides hardware, software, and contract services to implement a Deer Island plant-wide system.

Changes in Scope since FY97-99 CIP

Project	Change
Deer Island Plant-Wide System	New project for FY98-00.

CEB Impact

Projected operating expenses include education and training. The Sewerage Division will develop these costs for inclusion in the Final FY98-00 CIP.

1211. Clinton Landfill Liner Repair

Purpose

To make necessary repairs for the sludge landfill liner of Basin 1, if required by DEP, at the Clinton Treatment Plant.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Design	$75	Jul 97	Sep 97
Construction	$325	Oct 97	Dec 97
Total	$400		

Project History and Background

The Clinton landfill consists of three basins, with only Basin #1 currently operational. During the past two years, Clinton Treatment Plant staff and DEP have been concerned that during certain times of the year the flow rate exceeds the allowable permit value. In May 1996, MWRA installed improved flow measuring devices in the leachate collection system manholes. Since the installation of these devices, the flow measurements have been within allowable limits. Since the highest flows generally occur in the late fall and winter, Sewerage Division staff will not know until the Spring 1997 if the major source of flow and contamination is coming from Basin #1.

In May 1995, the results of a consultant's study estimated that the liner could be repaired for $300,000. The $400,000 proposed budget reflects engineering, inflation, and support costs. If it is determined by MWRA field sampling and analysis staff that the source of excessive secondary leachate flows is Basin #1, the liner will have to be repaired.

Scope

Project	Scope
Design	Evaluation and design of liner repair project.
Construction	Repair of liner.

Changes in Scope since FY97-99 CIP

Project	Change
Clinton Landfill Liner Repair	New project for FY98-00.

CEB Impact None.

1204. Deer Island Primary and Secondary Treatment Facilities

Purpose

The Massachusetts Water Resources Authority is constructing a wastewater treatment plant and related facilities to minimize the pollution of Boston Harbor. The new Deer Island Primary and Secondary Treatment Facilities are the largest component of the Boston Harbor Project (BHP), an 11-year, $3.6 billion effort started in 1988 to comply with the requirements of the federal Clean Water Act and to improve the harbor for recreational and commercial uses.

For purposes of capital budgeting and project organization, the Deer Island Primary and Secondary Treatment Facilities component of the Boston Harbor Project is composed of fifteen phases, with the eight major remaining active and planned phases listed in the table below. Descriptions of the major phases and the contracts included within these phases are presented separately.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Site Facilities Construction	$230,750	Jun 89	Jun 00
Pretreatment & Primary Construction	$674,258	Dec 90	Jun-98
Secondary Construction	$921,638	Aug 90	Jun 00
On-Island Residuals Construction	$312,171	Aug 91	Jun 97
Permanent Utilities Construction	$187,069	Jun 91	Oct 99
Construction Support Services	$85,568	Jul 89	Dec 00
Construction Management	$349,860	Apr 88	Dec 04
Lead Design Services	$108,697	Aug 88	Jun 99
All Other Phases	$174,632	Oct 88	Jun 00
TOTAL:	$3,044,643		

Project Scope

Prior to start of the project, 43 cities and towns in metropolitan Boston transported sewage to MWRA's two outdated primary sewage treatment plants which discharged 500 million gallons of poorly treated wastewater to the harbor each day. In addition, 500,000 gallons of processed sludge were discharged daily to the harbor on the outgoing tide. These discharges, plus the untreated wastewater that flowed into the harbor from combined sewer overflows, made Boston Harbor among the most polluted bodies of water in the nation.

The Boston Harbor Project is the second largest public works project ever undertaken in New England. The centerpiece of the project is the construction of a new primary and secondary treatment plant on Deer Island. When completed in 2000, the plant will be the second-largest sewage treatment plant in the nation.

MWRA is carrying out the BHP under a federal court order issued by U.S. District Court Judge A. David Mazzone. In December 1982, the City of Quincy filed suit in Massachusetts Superior Court, charging that wastewater discharges to Boston Harbor were in violation of the federal Clean Water Act of 1972, which requires secondary treatment of wastewater discharges. Judge Mazzone ordered the construction of the new primary and secondary facilities and, on May 8, 1986, issued a timetable for the project.

On June 16, 1993, MWRA submitted a report to the Federal Court which focused on MWRA efforts to reevaluate the scope of the project to achieve compliance with environmental requirements in the most cost-effective manner. The report outlined a strategy for development of steps that might lead to significant project savings, including savings on the secondary treatment plant.

The Secondary Treatment Facilities Plan completed in 1988 called for four batteries to handle levels of wastewater flows and pollutant loads projected for the 30-year planning period, based on information available at the time. Since that time, a study has been completed which determined that all four batteries are not needed to meet Clean Water Act requirements for providing secondary treatment. Judge Mazzone has approved MWRA's recommendation to eliminate Battery D and related facilities from the design of secondary treatment for Deer Island. The MWRA removed the cost associated with Secondary Reactor and Clarifier Battery D and Residuals Facilities Phase II from the FY96-98 CIP.

Construction of the new primary plant began in 1990. The court schedule called for half of the primary plant to be completed by mid-1994, with the entire primary plant completed and operational by mid-1995. MWRA began operation of the first phase of the new plant in January 1995. Batteries C and D and the first module of residuals were completed in July 1995. Construction of the secondary plant began in late 1992, and the third Battery is scheduled for completion in 2000.

Treatment Plant Operations

The new plant provides state-of-the-art primary treatment, which will remove 55 percent of solids and reduce biochemical oxygen demand (BOD) by 35 percent. Secondary treatment will further purify the wastewater, removing 85 percent of solids and 50 to 90 percent of toxins. Biochemical oxygen demand will be further reduced to a total of 85 percent.

Sewage from MWRA's 43 communities will be delivered to the new plant from several headworks, which screen out large objects that would damage equipment. Wastewater from the 22 communities in MWRA's North Collection System travels to the Deer Island plant through two existing deep-rock tunnels under the harbor, and through the North Metropolitan Sewer in East Boston and Winthrop. Sewage from the 21 cities and towns in MWRA's Southern Collection System will receive grit and screening removal at the new Nut Island headworks in Quincy before flowing to Deer Island through the 4.8 mile cross-harbor tunnel the Authority is constructing as part of the project.

Wastewater from the North Collection System arrives at the Deer Island North Main Pump Station/Winthrop Terminal Facility (NMPS/WTF). Following completion of the Inter-Island Tunnel, Wastewater from the South Collection System will be transported to the South System Pump Station (SSPS). Wastewater is then pumped to new primary clarifiers or sedimentation tanks, where it is retained for one to two hours. During that time, most of the heavier suspended solids will settle to the bottom of the tanks. There, plow-like scrapers move the solids to a sump or hopper at the entry end of the tank where they are drawn out of the bottom of the tank. These solids, called primary sludge, are pumped to gravity thickeners and ultimately to digesters in the residuals area for further treatment.

Secondary treatment will use aeration tanks to create a highly controlled environment in which microorganisms, naturally present in wastewater, consume suspended solids in the primary effluent. Oxygen will be added to encourage rapid growth of these helpful microorganisms. As a result, suspended solids will be converted to heavier solids. After about two hours, the mixture of wastewater and microorganisms will flow to sedimentation tanks, or secondary clarifiers, similar to those used during primary treatment. There microorganisms and other suspended matter will physically settle to the bottom.

Most of the settled sludge, which contains a high concentration of microorganisms, will be recycled to aeration tanks to perpetuate the biological process. The excess material, not necessary for maintaining the biomass, is called secondary waste activated sludge (WAS) and will be removed from the process and pumped to the residuals area.

The secondary sludge will be thickened in centrifuges to decrease its liquid volume. The primary and thickened waste activated sludge will then be blended and biologically stabilized in sludge digesters for at least 15 days to further decrease volume, and remove odor and kill disease-causing organisms. The sludge will then be processed through additional centrifuges to remove some of the remaining liquid to further decrease volume. The thickened sludge will be shipped by barge to the Fore River Staging Area in Quincy where it will be converted to fertilizer pellets through a heat-drying process.

At the end of the treatment process, the remaining wastewater will be disinfected with sodium hypochlorite to kill any remaining disease-causing organisms. Provisions have also been made for dechlorinating the effluent with sodium bi-sulfite, if studies find that the process is required. The treated effluent will then be discharged to the ocean through the 9.5-mile effluent outfall tunnel, where it will be released in deep water through 55 diffusers to ensure thorough mixing of the treated effluent with seawater.

Project Management

MWRA established the Program Management Division (PMD) to manage the design and construction of the new treatment facilities. PMD is assisted by two consultant teams: the Construction Manager (CM) and the Lead Design Engineer (LDE). In June 1990, the Board of Directors approved a five-year contract for a Construction Management (CM) Services Team, to be led by ICF Kaiser Engineers, Inc., for the period from January 1991 to December 1995. The contract includes three three-year options for extension, the first of which has been exercised to continue CM services and resident inspection from January 1996 through December 1998. Metcalf and Eddy was awarded the five-year LDE contract in August 1988. The contract was subsequently extended to December 1995 and then to December 1998.

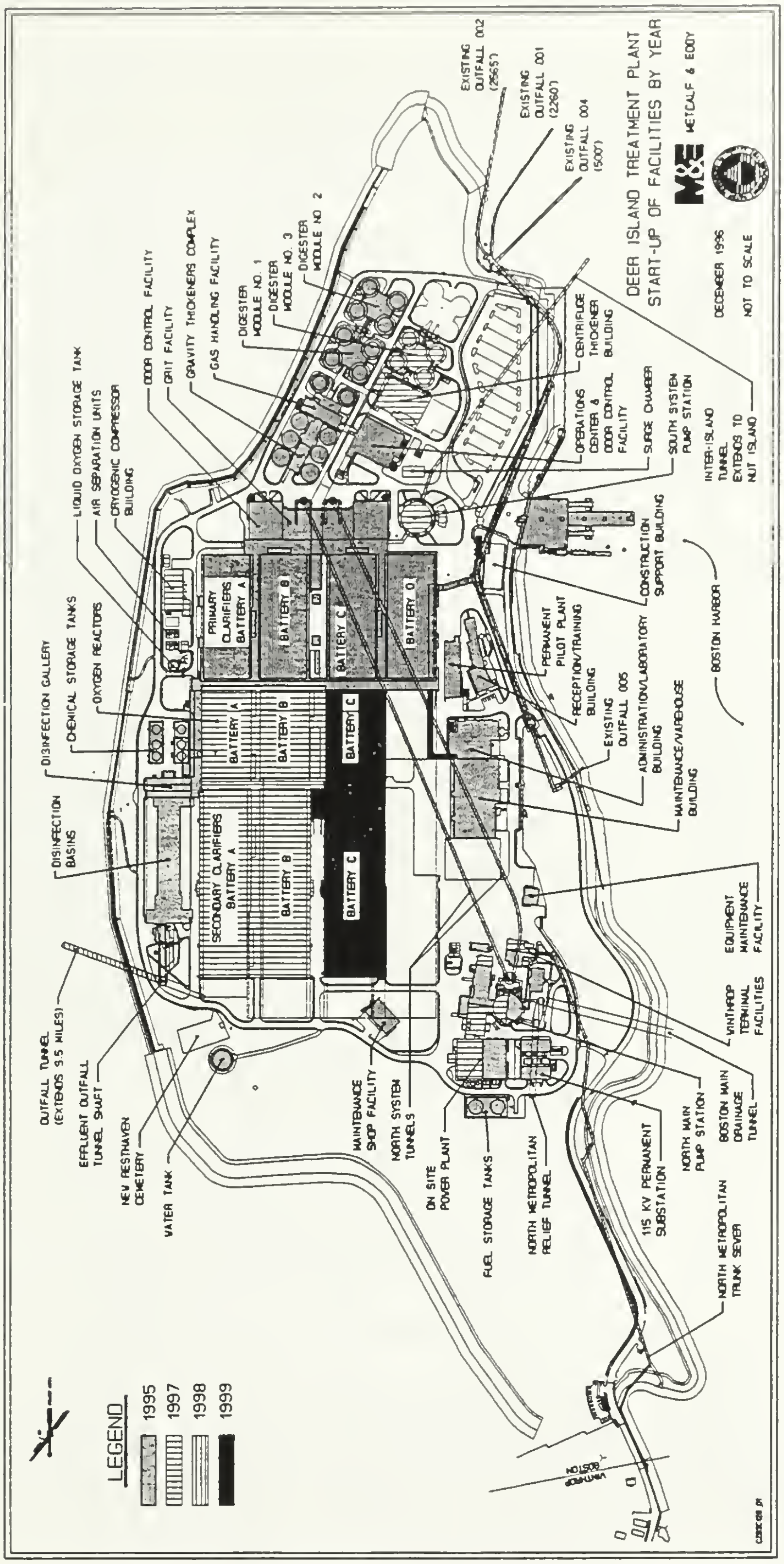
CEB Impact The CEB impact of the completion of the Boston Harbor Project represents the net effect of reductions to Nut Island's budget as it moves from being a treatment plant to a headworks, offset by increases to Deer Island's budget as it begins treatment of south system flows and provides secondary treatment for flows throughout the system. The impact also includes the incremental cost of performing additional outfall monitoring in Massachusetts Bay after the Effluent Outfall tunnel comes on-line.

Deer Island Treatment Plant ($000's)

CEB line item	Incremental Costs FY99	Incremental Costs FY00	Incremental Costs FY01	Incremental Costs FY02	Incremental Costs FY03	Description
Labor	$505	$74	$24	$0	$0	Transfer Nut Island staff to Deer Island, overtime, and contract employees to support secondary start up.
Chemicals	$2,781	($3,610)	($1,203)	$0	$0	Transfer of Nut Island flow to Deer Island; odor and corrosion control.
Utilities	($291)	$1,264	$422	$0	$0	Credits for CTGs and STGs in FY98 and beyond; Secondary comes on-line.
Maintenance	$127	$521	$184	$10	$310	Additional preventive, and corrective maintenance.
Other	$735	$39	$1,420	$0	$0	Public access; RO/RO continuation; BECo contract; other service contracts; increased outfall monitoring.
TOTAL:	**$3,857**	**($1,712)**	**$847**	**$10**	**$310**	

Deer Island Central Laboratory ($000)

CEB line item	**Incremental Costs FY99**	**Incremental Costs FY00**	**Incremental Costs FY01**	**Incremental Costs FY02**	**Description**
Maintenance	$10	$10	$10	$10	Equipment maintenance expense will continue to increase due to aging of the lab equipment.
Other	$30	$30	$35	$35	Equipment replacement needs will increase as the equipment becomes obsolete.
TOTAL:	**$40**	**$40**	**$45**	**$45**	


DEER ISLAND TREATMENT PLANT
START-UP OF FACILITIES BY YEAR
METCALF & EDDY
DECEMBER 1996
NOT TO SCALE
LEGEND
1995
1997
1998
1999
EXISTING OUTFALL 002 (2565')
EXISTING OUTFALL 001 (2260')
EXISTING OUTFALL 004 (500')
DIGESTER MODULE NO 2
DIGESTER MODULE NO. 3
DIGESTER MODULE NO 1
GAS HANDLING FACILITY
GRAVITY THICKENERS COMPLEX
GRIT FACILITY
ODOR CONTROL FACILITY
CRYOGENIC COMPRESSOR BUILDING
AIR SEPARATION UNITS
LIQUID OXYGEN STORAGE TANK
OXYGEN REACTORS
CHEMICAL STORAGE TANKS
DISINFECTION GALLERY
DISINFECTION BASINS
OUTFALL TUNNEL (EXTENDS 9.5 MILES)
EFFLUENT OUTFALL TUNNEL SHAFT
NEW RESTHAVEN CEMETERY
WATER TANK
MAINTENANCE SHOP FACILITY
NORTH SYSTEM TUNNELS
ON SITE POWER PLANT
FUEL STORAGE TANKS
NORTH METROPOLITAN RELIEF TUNNEL
115 KV PERMANENT SUBSTATION
NORTH MAIN PUMP STATION
BOSTON MAIN DRAINAGE TUNNEL
NORTH METROPOLITAN TRUNK SEWER
WINTHROP
BOSTON
PRIMARY CLARIFIERS BATTERY A
BATTERY B
BATTERY C
BATTERY D
SECONDARY CLARIFIERS BATTERY A
BATTERY B
BATTERY C
BATTERY C
CENTRIFUGE THICKENER BUILDING
OPERATIONS CENTER & ODOR CONTROL FACILITY
SURGE CHAMBER
SOUTH SYSTEM PUMP STATION
INTER-ISLAND TUNNEL EXTENDS TO NUT ISLAND
CONSTRUCTION SUPPORT BUILDING
BOSTON HARBOR
PERMANENT PILOT PLANT
RECEPTION/TRAINING BUILDING
EXISTING OUTFALL 005
ADMINISTRATION/LABORATORY BUILDING
MAINTENANCE/WAREHOUSE BUILDING
EQUIPMENT MAINTENANCE FACILITY
WINTHROP TERMINAL FACILITIES

Site Facilities Construction

Purpose

The Site Facilities construction phase of the BHP consists of 20 construction contracts with an estimated total cost of $230.8 million. These contracts are necessary to prepare the site for construction of the Primary and Secondary Treatment Facilities and to provide support facilities required for plant construction. A ten-year supply and delivery contract for concrete is included in this phase.

Expenditure Forecast and Schedule

Construction Package	Contract	Total Contract Amount ($000)	Begin date	End date
CP-020 (complete)	Asbestos Removal-Fort Dawes	$518	Jun 89	Jan 90
CP-021 (complete)	Demolition Ft. Dawes Bunkers	$4,617	Aug 89	Apr 90
CP-022 (complete)	Earthworks/Landfill/ Roadways	$17,107	Jan 90	Nov 91
CP-023 (complete)	Pump Station Modifications & Sewers	$5,713	Jan 90	Nov 90
CP-024 (complete)	Administration/Lab Maintenance/Warehouse Building	$48,894	Apr 92	Dec 94
CP-027 (complete)	Maintenance Shop Facilities Phase I	$395	Sep 91	Apr 92
CP-028 (complete)	Maintenance Shop Facilities Phase II	$1,970	Dec 91	Sep 92
CP-030 (complete)	Disposal of Excess Till	$14,137	Aug 90	Dec 91
CP-040 (complete)	Deer Island Demolition/Late Drumlin Excavation	$16,758	Dec 91	Jun 94
CP-042	Removal of Temporary Facilities	$250	Jul 99	Dec 99

CP-043	Late Site Preparation / Demolition of Existing Treatment Plant	$39,317	Feb 94	Jun 97
CP-048	Western Shoreline Protection	$20,210	Oct 97	Dec 99
CP-044	Final Paving & Landscaping	$27,955	Mar 98	Jun 00
CP-045	Dry Storage Building	$4,196	Jan 98	Feb 00
CP-049 (complete)	Hazardous Material Remediation Phase I	$7,433	Jun 91	Jun 94
CP-050 (complete)	Hazardous Material Remediation Phase II	$1,660	Apr 94	Apr 96
CP-051	Hazardous Material Remediation Phase III	$1,910	Apr 96	Apr 98
CP-905	Supply & Delivery of Concrete	$12,980	Apr 90	Dec 99
(complete)	Interim Transformer & Switchgear	$216	Jan 90	May 90
CP-805 (complete)	Deer Island Interim Sludge Facility	$4,514	Oct 90	Sep 91
	TOTAL:	$230,750		

The following narrative provides descriptions for only active contracts in this phase. Completed projects are listed in Appendix A.

Removal of Temporary Facilities (CP-042)

This contract funds the removal of the concrete batch plant foundation, and other temporary facilities required during construction.

Late Site Preparation/Demolition of Existing Treatment Plant (CP-043)

The process of decommissioning the existing primary treatment facilities began with the start-up of Primary Clarifier Batteries A and B. These original facilities will be fully decommissioned as MWRA is able to completely rely on the new plant. In addition to demolition, the area will be filled and graded in preparation for the construction of Secondary Battery C. This contract also included additional paving, landscaping, and demolition.

The south and west roadways will be ready for paving when the primary treatment facilities (Administration/Laboratory; Maintenance/Warehouse Building; South System Pump Station and Inter-Island Tunnel shaft; North System Headworks; and primary residuals handling facilities) are substantially complete. This construction contract will also include pathways, drainage, sidewalks, and curbing, and preparation for additional landscaping.

The Northern Revetment protection adjoins the concrete seawall shoreline protection included in the Primary Residuals contract (CP-301) and the Disinfection Facilities contract (CP-204). This will complete the shoreline protection on the northern, eastern, and southern portions of Deer Island. The revetment-type construction consists of largely rip rap (stone embankment) construction/rehabilitation, rather than major seawall construction, and is needed to protect the northern landform and Shirley Gut from ongoing erosion and to decrease the need for continued maintenance and repairs.

Western Shoreline Protection (CP-048)

The Western Shoreline Protection contract continues shoreline protection included in the Primary Residuals (CP-301), Disinfection Facilities (CP-204), and Late Site Preparation contracts (CP-043). This will complete the shoreline protection for all of Deer Island. This portion of shoreline protection is a mixture of revetment-type construction, consisting primarily of large rip rap and a mini-concrete seawall in some areas. It is needed to prevent erosion on the main access road along this shoreline and to protect major plant utilities under the roadway.

Replacement of the Shirley Gut Siphon, located on the western shoreline of Deer Island, is included in the project budget.

Final Paving and Landscaping (CP-044)

The Final Paving and Landscaping contract includes development of the final land forms, construction of the north and east roadways, shoreline protection at a temporary fuel facility area, and all remaining landscaping of permanent buildings. Removal of a temporary wheel wash facility, a temporary fuel facility, a trash facility, and the construction of a public docking facilities and a permanent parking lot are included in this contract. Work under this contract will begin once permanent facilities are substantially complete.

Dry Storage Building (CP-045)

The Maintenance/Warehouse building's north end may be extended to incorporate additional dry bulk storage warehousing, electrical shop space, heated garage bays for heavy motor vehicles, and a covered trackway for access to shops. Additional storage space may also be needed for equipment, hazardous materials, sand, and salt. The final configuration will be determined through the preparation of a feasibility study included in the DP-40 scope.

Hazardous Material Remediation Phase I (CP-049)
Hazardous Material Remediation Phase II (CP-050)
Hazardous Material Remediation Phase III (CP-051)

Existing hazardous waste on Deer Island is being remediated while construction of the new treatment facilities proceeds. Hazardous waste investigations began as part of the scope of work for the Early Site Preparation design. Site investigations indicated that contamination on the island was more extensive than originally estimated in the Facilities Plan. In response to the contamination encountered, an island-wide approach to hazardous waste site assessment and remediation was adopted.

A hazardous materials management consultant (DP-27) was contracted to complete site investigations, design an island-wide remediation plan, and acquire the necessary regulatory approvals for implementing remediation.

The Hazardous Waste Remediation contractor (CP-049) stockpiled contaminated materials removed from construction areas, tested materials to determine if they should be reprocessed or shipped off-site for disposal, reprocessed suitable materials into asphalt to be used on Deer Island, and shipped unsuitable materials for disposal to licensed facilities. The contractor also installed and operated a system to remove oil from groundwater, provided disposal for hazardous wastes other than contaminated soil (buried drums, etc.), and provided emergency response for spills and new discoveries of hazardous materials.

The second phase of remediation was extended through CP-050 for an additional two years from the original contract. A third phase extends the services for another two years through CP-051 to unearth and handle additional contaminated soil, to continue groundwater recovery and treatment, and to meet DEP requirements for additional site remediation.

Supply and Delivery of Concrete (CP-905)

Construction of the treatment plant and the tunnels requires approximately one million cubic yards of concrete over a ten-year period. Due to a mitigation agreement with the Town of Winthrop, this quantity cannot be transported through the town. As a result, the MWRA entered into a ten-year contract with a concrete supply firm to produce all the standard classes of concrete required for the project at the construction site. The mixing facility is located on-island because concrete must be placed in forms shortly after mixing and therefore could not be barged from an off-island plant. Each contractor must purchase concrete from this supplier.

The contract requires the supplier to barge all bulk concrete materials to the island, off-load at the bulk piers, and maintain a reserve of raw materials within a specified area. The supplier is required to produce up to 1,600 cubic yards per eight hour shift and to guarantee delivery to each of the contractors within the first six hours of the work day. Since concrete is such a significant component of the construction process, capacity and quality control are extremely important.

Each contractor enters into a contract with the supplier for supply and delivery of each type of concrete at a fixed unit price. The unit price is established to recover the concrete operator's cost of plant construction, operation, and demolition. Therefore, each sub phase budget includes an amount for the required quantity of concrete at its specific unit cost. The sub phase budgets do not provide for the plant operator's recovery of inflation related increases for labor and material. These inflation payments are included in CP-905. Since 1992, and continuing for the life of the contract, the MWRA has been making quarterly payments to the concrete plant operator for the higher costs, using an industry accepted inflation index.

Pretreatment and Primary Construction

Purpose

The Pretreatment and Primary Plant Construction phase includes contracts for the construction of the inter-island tunnel, pretreatment facilities on Nut Island and Deer Island, primary transmission facilities, primary clarifiers, and ancillary primary plant facilities. Pretreatment and Primary Plant construction is estimated to cost $674.3 million.

Expenditure Forecast and Schedule

Construction Package	Contract	Total Contract Amount ($000)	Begin date	End date
CP-101 (complete)	North System Tunnels	$20,623	Dec 90	Jul 92
CP-102	North Main Pump Station	$91,273	Jun 91	Jun 97
CP-103 (complete)	North System Headworks	$96,097	May 91	Dec 94
CP-104	South System Pump Station	$42,075	Nov 91	Nov 97
CP-105 (complete)	Primary Clarifier Batteries A & B	$100,197	Mar 91	Dec 94
CP-130 (complete)	Primary Clarifier Batteries C & D	$84,405	Mar 92	Jul 95
CP-151	Inter-Island Tunnel / Extended Outfall Protection	$147,324	Apr 91	Sep 97
CP-152	Nut Island Headworks	$65,672	Jul 92	Jun 98
CP-153 (complete)	Nut Island Headworks Equipment	$347	Mar 91	Mar 92
CP-160	Ancillary Deer Island Modifications Phase I	$10,246	Mar 95	Dec 96
new contract	Concrete Coating / Repair & Upgrade	$15,999	Mar 97	Dec 97
	TOTAL:	$674,258		

The following narrative provides descriptions for only active contracts in this phase.

North Main Pump Station (CP-102)

The existing North Main Pump Station (NMPS) will be retained and modified for use in the new plant. Ten sewerage pumps, drives, and related mechanical systems will be removed and replaced. Five 700 kilowatt generators will be removed and motor starters, motors, transformers, and variable frequency drives will be installed. Four new 13.8/4.16 kilovolt transformers will also be installed. New valves on both the suction and discharge sides of the pumps will be inserted and new discharge headers inside and outside of the station will be added.

This contract also includes construction of an odor control facility. This facility will collect and treat odor-laden air from the Winthrop Terminal and the two on-island north system tunnel shafts. Underground concrete ducts will transport the air to the odor control facility where scrubbing and absorption equipment will be used to treat the air prior to its discharge through stacks. Modification of the southern end of the existing NMPS power plant will be required to accommodate these facilities. Connecting piping and the twin surge tanks necessary to tie to the North System Tunnels (CP-101) will also be built under this contract.

The Winthrop Terminal Facilities will also be retained and modified for use in the new plant. Six pumps and related mechanical systems will be removed and replaced. New discharge lines and 4.16 kilovolt switchgear will be installed. The existing motor room will be expanded.

South System Pump Station (CP-104)

The South System Pump Station, located to the west of the North System Headworks, will pump screened and degritted wastewater from the Inter-Island Tunnel to the treatment facilities at Deer Island. Under normal operation, south system flow will be discharged to the effluent channel in the pretreatment gallery of the North System Grit Facility, where it will be combined with the degritted North System flows. The pump station will include eight 60-mgd raw wastewater pumps: six to handle peak flows, and two to provide back-up capacity.

Inter-Island Tunnel / Extended Outfall Protection (CP-151/031)

The Inter-Island Tunnel and shafts will transport wastewater flows from Nut Island to Deer Island. This contract includes construction of a 4.8 mile concrete-lined deep rock tunnel measuring approximately 11.5 feet in diameter. A 16-foot diameter shaft on Deer Island and an 11-foot diameter influent tunnel that connects the Deer Island shaft with the South System Pump Station has also been constructed. Construction of a 16-foot diameter shaft on Nut Island, a 12-foot by 12-foot headworks effluent channel connecting the Nut Island shaft and headworks facility, and a 36-inch diameter stub pipeline for future connection with the Braintree-Weymouth tunnel system are also included in this contract.

In addition, twin 14-inch sludge pipelines will be embedded within the tunnel and the Deer Island shaft to allow pumping of sludge from Deer Island to the Fore River residuals processing facility starting in 2001. This contract also provides for construction of 1,500 linear feet of a reinforced concrete relieving slab to protect the existing outfall and junction chamber from construction equipment and truck traffic. A connection from the new bypass conduit to the existing plant outfall conduit will also be constructed. Protection of the existing conduit required drilling and placing 28,000 linear feet of piles, and relocation and protection of existing utilities. On November 4, 1995, operators of the tunnel boring machine broke through from the Inter-Island Tunnel to the Nut Island shaft, connecting the two islands.

Nut Island Headworks (CP-152)

The Nut Island Headworks will screen out large objects and remove sand and other grit from the wastewater before the flow is conveyed through the Inter-Island Tunnel to the new primary treatment facilities.

This contract includes construction of the following components:

- Bar screens
- Grit separation chambers
- Odor control facilities
- Emergency generator
- Truck bays for removal of grit and screenings
- Operation and maintenance areas
- Administration area
- Headworks influent/effluent conduit
- Community historic room
- Water storage tank and fire pump

- Fuel oil storage tank for energy generators

All inter-connecting piping, electrical and control systems, plumbing fixtures, and related mechanical equipment are also included.

The existing Nut Island Wastewater Treatment Plant will remain in operation throughout the construction of the new headworks facility. In order to accomplish this, modifications and relocation of some of the existing facilities had to occur prior to the start of the headworks construction. Existing facilities affected by the location of the headworks facility include the pre-aeration basins, the generator wing of the main building, the gas control building, and approximately 300 feet of the plant influent and effluent conduits.

Modifications to the pre-aeration basin were substantial. Pre-aeration Basins No. 1 through 3 were demolished and all existing plant flows now pass through Pre-aeration Basin No. 4.

All of the existing treatment plant structures will be demolished after completion of the headworks facility. A passive park landscaped with trees, shrubs, and jogging paths will be constructed along the north and east shores. Overlooks and seating areas will be located on the east and west shores of the Island.

Nut Island Headworks Equipment

An 800 kilowatt diesel generator has been purchased to provide an essential backup power supply to the current plant. Once the existing treatment plant is dismantled, this generator will be used in the new Nut Island Headworks.

Ancillary Deer Island Modifications Phase I (CP-160)

This contract includes modifications of the following facilities: pier facility, scum disposal, metal and chlorine buildings, plant-wide pigging system, chemical storage facility at NMPS, microwave tower, temporary parking lots and guard shack, lubrication oil storage, North Metropolitan Sewer abandonment, and demolition of service area #5.

The Deer Island Pier will be modified to meet future transportation needs as well as requirements for pipe chase and valve pit, chemical loading, safety, and fire protection.

The original purpose of the metal and chlorine buildings was to provide temporary vehicle maintenance and storage space. It has been determined that with minor modifications these facilities can provide these services permanently. Therefore, the proposed permanent dry storage building has been significantly reduced in size and the proposed permanent vehicle maintenance building has been eliminated.

Concrete Coating / Repair & Upgrade

Due to higher than anticipated concentrations of Hydrogen Sulfide in the influent system, there has been some deterioration of the concrete and concrete coating at several locations at Deer Island. The deterioration is primarily at the water line in various facilities and will require repair of the concrete and application of a new protective coating.

Secondary Plant Construction

Purpose

The Secondary Plant construction phase includes construction of three secondary reactor batteries, three secondary clarifier batteries, a full treatment pilot plant, a disinfection facility, a seawall, a hydroelectric power station, an effluent outfall tunnel and diffusers, and a potable water storage tank. The total cost of Secondary Plant construction is estimated to be $921.6 million.

- Three secondary reactor batteries, or aeration tanks, will be constructed. Oxygen will be supplied to these tanks from a cryogenic generator. The aeration tanks will contain microorganisms to biologically treat the wastewater. Three secondary clarifier batteries will be constructed to serve as settling tanks for this mixture.

- A pilot plant has been built and is being used as a research tool for testing operation prior to use in the full-scale facilities and to provide a permanent facility for operator training.

- A disinfection facility is being constructed which will add chlorine to the primary and secondary effluent. A hydroelectric facility powered by the effluent flows from the disinfection facility is also being constructed as part of this phase. The plant has been designed to produce more than 12 million kilowatt hours of electricity per year.

- A deep rock effluent outfall tunnel and diffusers are also being constructed to carry treated effluent from Deer Island into Massachusetts Bay. Other secondary treatment plant facilities included in this phase are a secondary odor control facility, the secondary operations building, and the waste sludge system.

Expenditure Forecast and Schedule

Construction Package	Contract	Total Contract Amount ($000)	Begin date	End date
CP-201 (complete)	Permanent Pilot Plant	$11,942	Dec 91	Dec 94
CP-202	Secondary Reactor Batteries A & B	$118,392	Nov 92	Dec 96

CP-203	Secondary Clarifier Batteries A & B	$147,622	Aug 93	Dec 97
CP-204	Disinfection Facilities Phase I / Seawall	$41,906	Aug 92	Feb 96
CP-205 (complete)	Water Storage Tank	$9,061	Dec 92	Jan 95
CP-210	Ancillary Deer Island Modifications Phase II	$3,808	Jul 96	Jan 98
CP-211	Ancillary Deer Island Modifications Phase III	$10,021	Jun 97	Jun 99
CP-212	Ancillary Deer Island Modifications Phase IV	$15,325	Jun 98	Jun 00
CP-241	Disinfection Facilities Phase II / Hydroelectric Plant	$37,752	Jul 93	Nov 96
CP-260	Secondary C Reactor & Clarifier Batteries	$141,267	Dec 96	Dec 99
N/A	Equipment Prepurchase	$959	Dec 93	Dec 96
CP-282	Effluent Outfall Tunnel	$274,593	Aug 90	Sep 98
CP-283 (complete)	Effluent Outfall Diffusers	$77,088	Aug 90	Nov 92
CP-285 (complete)	Effluent Outfall Project Tunnel Muck Processing & Disposal	$14,449	Sep 91	Nov 94
CP-286	Effluent Outfall Tunnel Project Muck Processing & Disposal II	$17,453	Dec 94	Jul 97
	TOTAL:	$921,638		

The following narrative provides descriptions for only active contracts in this phase.

Secondary Reactor Batteries A and B (CP-202)
Secondary Clarifier Batteries A and B (CP-203)
Secondary Reactor and Clarifier Battery C (CP-260)

The secondary treatment facility at Deer Island will be a high-purity oxygen activated sludge system. This facility includes selector basins, three secondary reactor batteries (A, B, and C), three secondary clarifier batteries (A, B, and C), a cryogenic oxygen generation system, and a secondary odor control facility. Construction of secondary cross galleries, the secondary operations building, and the waste sludge system are also included in this phase.

Construction of the secondary treatment facilities has been divided into three contracts: Reactor Batteries A and B (CP-202), Clarifier Batteries A and B (CP-203), and Reactor and Clarifier Battery C (CP-260). The Reactor Batteries A and B phase includes the cryogenic compressor building, two of the three cryogenic generation units, a liquid oxygen storage tank, Secondary Reactor Batteries A and B, the Secondary Odor Control Facility, the Secondary Operations Building, and Reactor Gallery A/B. This phase also includes secondary electrical buildings, portions of the Secondary Cross Galleries, and all the interconnecting piping, electrical, and control systems necessary to make these processes functional.

The contract for Secondary Clarifier Batteries A and B (CP-203) includes construction of two batteries of secondary clarifiers, secondary gallery A/B, return waste sludge pumping facilities, scum facilities, and electrical buildings.

The contract for Battery C (CP-260) includes construction of the final cryogenic generation unit, Secondary Reactor and Clarifier Battery C, secondary odor control equipment, duct work for Battery C, and Reactor Gallery C. Also included are secondary electrical buildings, a stair/elevator building, portions of the Secondary Cross Galleries, and all of the interconnecting piping, electrical, and control systems necessary to make these processes operational.

After passing through the primary clarifiers, wastewater from each of the four primary batteries will flow through an effluent channel into the secondary reactors. The system will utilize flow meters and control valves to distribute flows among the three secondary batteries under normal operating conditions. The system will, however, have the capability to regulate flow to each of the batteries. Once the flow is directed to a battery, it will normally pass sequentially through the selector and clarifier associated with that battery. The system will have the flexibility to transfer or mix flows among secondary clarifier batteries downstream of the secondary reactors.

The selectors will provide a controlled environment whereby organisms that settle well and thus are easily removed in the clarifiers will predominate over poorer settling organisms. The beneficial organisms will thereby be "selected" during this process and harmful organisms will be eliminated.

From each selector, wastewater will flow through a gate to the respective covered secondary reactor, or aeration basin. These reactors will create an environment where oxygen is added for the respiration of the "selected" organisms. The three reactor batteries will be located between the primary clarifiers and the secondary clarifiers. Each battery will consist of three trains divided into six stages. The first two stages will be designed as selectors that can serve a dual role as additional aerobic basins.

The remaining four stages will serve as oxygen reactor basins. Batteries A, B, and C will be separated by two major north-south galleries, Reactor Galleries A and B and Reactor Gallery C.

The primary cross gallery will run east-west and separate the secondary reactor batteries from the primary clarifiers to the south. The secondary cross gallery will also run east to west and separate the secondary reactors from the secondary clarifiers to the north. The galleries will provide personnel access and utility routes between adjacent facilities. The cryogenic generation facility will be located east of Primary Clarifier Battery A. The secondary odor control facility will be located in the secondary odor control gallery between Secondary Reactor Batteries B and C. The odor control facility will utilize carbon absorption units. The waste sludge system will consist of the booster pumps and piping necessary to transport excess secondary sludge from secondary treatment to the residuals area for processing.

A cryogenic generator, or cold box system will supply oxygen to the aeration basins. The cryogenic air separation process will involve compressing and cooling air until liquefaction occurs, removing impurities by low pressure condensation, then separating the oxygen from the air by fractional distillation. The system will be composed of three 150-ton/day cryogenic oxygen generators, a control building to house compressors, air filtering equipment, and electrical equipment. Offices, a control room, an analyzer room, locker rooms, a lunch room, and storage and maintenance areas will also be located at this facility. A cooling system for each generator and liquid oxygen storage space is also included. The oxygen from the generation area to the reactor basins will be transported above ground through a looped 18-inch carbon steel pipe.

The effluent from the reactor basins will pass through a shared effluent channel to the secondary clarifiers. In these clarifiers, microorganisms and other suspended matter will settle to the bottom. As in the primary clarifiers, chain and flight mechanisms will collect settled solids and deposit them in common hoppers. Scum will be scraped from the surface of the water and deposited in a scum wet well. Scum from the wet well will be pumped to the residuals treatment facilities.

The secondary clarifiers will be located north of the oxygen reactor batteries and east of the existing North Main Pump Station. To the east, the clarifiers will be bordered by the disinfection basins.

Each battery will consist of 18 sets of stacked clarifiers. Each set will measure approximately 193 feet long by 40 feet wide by 33 feet deep, with the top open to the atmosphere. The total size of each battery will be 1,494 feet long by 193 feet wide.

Two galleries will run north/south between basins A and B and adjacent to basin C. These galleries will measure 1,494 feet long by 72 feet wide. The galleries will house the Return Activated Sludge (RAS) pumps, associated piping and valves, and controls for sludge transfer from the clarifiers to the anaerobic selectors, with waste sludge to be pumped to the residuals area for further processing.

The scum facilities and pump stations will be located on the east side of Battery A, between Batteries B and C, and on the west side of Battery C. These three structures will house the secondary scum mixers, scum pumps, and associated piping. The scum will be pumped to the Residuals area for processing in the digesters. The pump rooms located on the east and west sides of the secondary batteries will be 34 feet long by 36 feet wide by 32 feet high with 900 square feet of floor space. Attached will be a superstructure with 572 square feet of floor space housing the electrical room, stairs, and scum mixer driver. The facility located between Batteries B and C will be approximately 38 feet long by 31 feet wide by 33 feet high with 1,178 square feet of floor space. This structure will contain the scum pumps, the scum mixer, an electrical room, and stairs.

The addition of a polymer injection system to the secondary clarifiers is necessary to maintain adequate settleability of sludge. An interim liquid emulsion polymer system will be installed within the existing space of the secondary odor control facility to meet the initial needs of Batteries A and B. A new dry polymer system will be installed between Batteries B and C and will ultimately serve all three secondary batteries allowing more flexibility in choice of polymers and system efficiency. The system will supply between 4000 lb/day and 20,000 lb/day of polymer dosage to the secondary clarifier system.

The electrical/stair facilities will be located on the roofs of the secondary galleries running between Batteries A and B and adjacent to Battery C. These facilities will contain a unit substation, motor control centers to power and operate the clarifiers, return sludge pumps and associated equipment. Each gallery will include two buildings which will occupy 3,520 and 3,014 square feet, respectively.

Disinfection Facilities Phase I/Seawall (CP-204)
Disinfection Facilities Phase II/Hydroelectric Plant (CP-241)

The disinfection facilities were to be built in three phases to allow for early construction of the process system, half of the chemical storage, and the disinfection facilities needed to operate new primary clarifier Batteries A and B. However, it was determined that the third phase of this contract is no longer needed and therefore it was eliminated from the project scope.

The design criteria for the disinfection basins has been reevaluated in light of the additional detention time that will take place in the new outfall tunnel, resulting in a reduction in the number of disinfection basins from four to two.

The Deer Island Disinfection Facilities will be located south of the effluent outfall tunnel shaft and east of Secondary Clarifier Battery A. These contracts include disinfection basins, plant process water pumps, chemical storage facilities, a disinfection gallery, an electrical building, and two low head turbine generators.

As originally planned, the chlorine disinfection basins will consist of a serpentine channel making three-passes, each 500 feet long, with an overall width of approximately 180 feet for the two basins. The two disinfection basins were designed to provide for disinfection of primary and/or secondary effluent at a peak flow of 1,270 mgd.

The chemical storage facilities will consist of six 250,000 gallon tanks and associated equipment for the storage and distribution of sodium hypochlorite and sodium bisulfite. These facilities will be located on the south side of the Disinfection Gallery. Three of the tanks will be used for hypochlorite storage, two for bisulfite storage, and one as a standby storage tank for either of the two chemicals.

Provisions for both barge and truck delivery of the two chemicals are included in these contracts. Barge delivery is the primary method of delivery due to the large volume of chemicals required and the mitigation agreement with the Town of Winthrop. Sodium hypochlorite solution will be pumped to the storage facility from barges at the pier facilities through two eight-inch PVC pipes. Similarly, sodium bisulfite solution will be pumped to storage through two eight-inch PVC pipes. Sections of the four PVC pipes that are installed underground will be laid in concrete pipe chases. MWRA is currently considering, and this proposed CIP includes, the construction of an on-site sodium hypochlorite generation plant on Deer Island. A life cycle cost analysis indicates on-site generation will be more cost effective than the continuing purchase and transport of the chemical to the

Deer Island plant. See narrative for CIP Project # 1208.

An 84 feet long by 180 feet wide disinfection gallery, containing process equipment and piping, is located between the disinfection basins and the tank storage area. An electrical building is located on top of the disinfection gallery. This gallery will house the plant water pumps. The plant water pumps will draw secondary effluent from the disinfection basins. The secondary effluent will be used as non-potable process water throughout the new plant.

A hydroelectric power facility will be constructed and powered by effluent flows from the disinfection facility. The facility will consist of two turbines with a maximum capacity of 2,000 kilowatts. These turbines will be housed in a deep concrete structure, located in the bypass conduit between the disinfection basins and the outfall shaft. Control systems will automatically adjust the units for changing effluent flows, and shut down the turbines and bypass the flows in the event of a problem with the hydropower equipment.

This hydroelectric power facility will produce an average of 1,400 kilowatts per hour resulting in the production of more than 12 million kilowatt hours per year. Electricity will be fed to the 13.8 kilovolt power distribution system for use on Deer Island.

The portion of the seawall that replaces the existing seawall will also be constructed under this phase. The area covered will be from the new Resthaven Cemetery to the south end of the existing seawall, approximately 2,600 feet.

Ancillary Deer Island Modifications Phase II (CP-210)
Ancillary Deer Island Modifications Phase III (CP-211)
Ancillary Deer Island Modifications Phase IV (CP-212)

As part of the Boston Harbor Project design review process there are improvements suggested to the proposed design which were not included in the basic contract documents. Some of these items may have been suggested too late in the design development stage to be included in the bid documents. Other improvements are not recognized as a need until plant staff actually begin operation of the facility. In both of these cases, the requested changes are grouped as a separate construction contract. These contracts are referred to as Ancillary Plant Modifications. There are four phases in total, three of which are in this phase grouping. Two of the four phases are in construction, and the remaining phases are at varying stages of design.

The scope of these contracts cover a wide array of work. At times it is necessary for portions of an existing scope to be deleted and repackaged into the Ancillary contracts to avoid potential delay costs. Therefore, some of the construction components are scope items which have been deleted from existing contracts.

The remaining scope items are modifications throughout the plant. The modifications include specific civil site and electrical work as well as modifications in the general areas of the South System Pump Station, Primary Plant, Residuals Facility and miscellaneous work.

Effluent Outfall Tunnel (CP-282)

The outfall tunnel will discharge treated effluent from the Deer Island Plant east/northeast into Massachusetts Bay. This phase includes construction of a vertical access shaft at Deer Island and the effluent outfall conduit, excavation of the outfall tunnel, lining of the tunnel with precast concrete panels, connection of the tunnel to the vertical riser shafts installed by CP-283, and transport of tunnel spoils to processing sites on Deer Island. The total length of the outfall tunnel, including the portion below the diffusers, is 9.5 miles. The finished diameter of the tunnel will be 24.25 feet.

The outfall shaft consists of a 30-foot diameter vertical shaft approximately 440 feet deep. The effluent outfall conduit will carry the flow from the disinfection basins to the outfall shaft. With the exception of the upper 110 feet of the Deer Island shaft and effluent outfall conduit, all excavation is expected to be in rock by driving the tunnel boring machine through the tunnel on a straight grade up from the Deer Island shaft to the diffuser area.

Effluent Outfall Project Tunnel Muck Processing and Disposal (CP-285)
Effluent Outfall Project Tunnel Muck Processing and Disposal II (CP-286)

These contracts provide for processing 1.7 million tons of tunnel muck for reuse as select backfill and for other purposes. These contracts also provide for disposal of excess muck totaling approximately 2.3 million tons. The barge loading site for transport to an off-island disposal site is located adjacent to the concrete batch plant, and the processing site is located on a platform prepared under the contract for disposal of excess till (CP-030).

On-Island Residuals Construction

Purpose

This phase includes contracts for construction of facilities required for residuals handling on Deer Island, which will consist of sludge thickening and anaerobic digestion. Separate primary and secondary sludge thickening facilities are being constructed in this phase. Primary sludge will be thickened in gravity thickeners while secondary sludge will be thickened using solid bowl centrifuges. The total cost of On-Island Residuals construction is estimated to be $312.2 million.

The residuals facilities' operation building will be located in the Operations and Odor Control Center during the interim period when only Residuals 1-A/1-B (CP-301) are on-line. The Operations and Odor Control Center is a 190-foot long by 159 foot wide by 56 foot high, four-level, reinforced concrete building. The final location for the permanent operations center will be in the Centrifuge Building.

Expenditure Forecast and Schedule

Construction Package	**Contract**	**Total Contract Amount ($000)**	**Begin date**	**End date**
CP-301 (complete)	Residuals Treatment Facilities Phase I Primary Batteries A, B, C, & D	$213,795	Aug 91	Dec 95
CP-303	Residuals Treatment Facilities Phase I Secondary Batteries A & B	$98,376	Oct 93	Jun 97
	TOTAL:	$312,171		

Residuals Treatment Facilities Phase I Secondary Batteries A and B CP-303)

A digester module will be constructed to process the additional quantities of residuals from Secondary Clarifier Batteries A, B, and C. A centrifuge facility is being built to thicken waste secondary sludge as well as processed sludge. Twelve centrifuges will handle secondary waste sludge, while the remaining four will thicken combined sludge after digestion. The centrifuge facility will consist of a 202-foot long by 148-foot wide by 57-foot high, reinforced concrete building with four levels. The underground gallery network will be expanded to encompass these facilities. The odor control system duct and equipment will also be expanded. This building will also contain polymer feed systems, auxiliary equipment, and sludge conveyance equipment. Facilities and equipment for handling thickened secondary sludge, returning concentrate to the liquid treatment train, and centrifuge wash water will also be provided.

Permanent Utilities Construction

Purpose

This phase will provide the utilities necessary to construct and run the new Deer Island Treatment Plant. Included in this phase are contracts to provide water utility lines through Winthrop (CP-401), yard utilities including permanent distribution lines for electric power and a permanent switchgear facility (CP-427 and 402), a thermal/power plant (CP-428) to provide required heat on the island, and combustion turbine generators (CP-431). Process instrumentation and control systems (CP-450), a facility information system, and a plant personnel protection system (CP-452) are being implemented as part of this phase to provide process and administrative information to all supervisory and operational personnel. The total cost of Permanent Utilities Construction is estimated to be $187.1 million.

Expenditure Forecast and Schedule

Construction Package	**Contract**	**Total Contract Amount ($000)**	**Begin date**	**End date**
CP-401 (complete)	Off-Island Water Line	$14,671	Jan 93	Nov 95
CP-427 (complete)	Main 13.8 KV Switchgear, Building, & Distribution / Yard Utilities	$21,245	Jun 91	Mar 95
CP-428	On-Site Thermal / Power Plant	$76,667	Jan 93	May 97
CP-431 (complete)	BECo Combustion Turbine Generators	$34,365	Jan 94	May 95
CP-450	Process Information & Control System	$21,288	Jan 93	Oct 99
N/A	Facility Information System	$6,462	Jan 93	Aug 97
CP-452	Personnel Protection System	$12,431	Jan 93	May 99
	TOTAL:	$187,069		

The following narrative provides descriptions for only active contracts in this phase.

On-Site Thermal/Power Plant (CP-428)
BECo Combustion Turbine Generators (CP-431)

An on-site oil-fired power and gas-fired thermal plant is being constructed on Deer Island. This contract includes construction of the building that will house the turbine and thermal plant, construction of thermal facilities, and provision of fuel oil storage tanks.

The existing submarine cable to Deer Island is intended to serve as the primary source of electric power for the new treatment plant. The power plant is intended to be a back-up source of electric power in the event that there is an interruption of the primary supply. According to the Environmental Protection Agency (EPA) mandate, the plant must be able to withstand such an interruption and still provide at least primary-level treatment of the full design flow. This requirement was set forth in the Secondary Treatment Facilities Plan.

It is anticipated that two oil-fired combustion turbines and a steam turbine driven by the new boilers, in combination with existing on-island diesel generator capacity, will be needed in the power plant to meet the estimated electric load requirements.

The building housing the power plant is being designed with the flexibility to meet future contingencies including a change in purchased power costs, which would make it cost-effective for the MWRA to generate its own primary power supply; improved markets for power and/or capacity sales; and a possible future need for additional power. The design of the building will facilitate plant expansion to either a primary source of power for the island, or into a larger backup source, as future needs dictate. Such changes to the power plant would require a new air quality permit.

The thermal plant will include two boilers, a steam turbine, and a condensing heat exchanger to provide high temperature hot water for the central plant heating system for the new treatment plant buildings and for sludge processing. The thermal plant boilers will be fired with digester gas supplemented by fuel oil. Digester gas will be treated to remove hydrogen sulfide before being burned. This will limit emissions to acceptable levels.

The thermal plant and the power plant will be contained within a single building. The fuel oil storage tanks will be located to the north of the facility, on the other side of the perimeter road.

Process Information and Control System (CP-450)

The Process Information Control System (PICS) contract is the plant-wide computer-based system on Deer Island which controls the entire treatment process. The PICS hardware is distributed throughout virtually every facility and is anchored by a series of area control centers. Communication flows are controlled through a network of conduit, junction boxes, wireways, and duct banks. PICS also subsumes the Facility Information System network which links the Deer Island Treatment Plant computer system to the Charlestown Navy Yard computer network. This system generates plant operations reports and maintains an extensive plant inventory database.

Facility Information System

The Deer Island treatment plant utilizes a Facility Information System (FIS) to provide operations and maintenance management tools for supervisory staff. The FIS connects with the Authority's existing management information systems. The additional hardware, software, and programming needed for Deer Island will be provided through this contract.

The FIS includes an Operations Management System (OMS) with a Plant Operations, NPDES reporting application, and a Laboratory Information Management System (LIMS). The Plant Operations and NPDES reporting application provide managers and supervisors with routine operational and compliance reports and process trend information for use in evaluating operational efficiency. The LIMS provides services to meet the laboratory needs for Deer Island process control, NPDES programs, residuals, harbor studies, TRAC, CSOs, off-island residuals, and air monitoring.

Also included in the FIS contract is a Maintenance Management System (MMS), which provides preventive and corrective maintenance scheduling capabilities and management functions, historical analysis for assessing and improving maintenance and cost, and inventory management of materials. The MMS will interface with Materials Management, Purchasing, Technical Information Center, CADD/DP, Scheduling, and Safety applications systems.

FIS covers administrative applications for safety management, and supporting hardware and data networks. The Facilities Information System contract is managed by the Sewerage Division.

Personnel Protection System (CP-452)

The Personnel Protection System (PPS) contract is comprised mostly of the island-wide fire system, which includes fire detection and suppression capabilities and will automatically alert island staff and the Boston and Winthrop Fire Departments as the situation dictates. PPS also includes the Private Branch Exchange telephone system; the page/party system, a network of handsets and speakers; the card access system, designed to limit access to specific plant areas; and the closed circuit television monitoring system which provides visual surveillance in key areas.

Construction Support Services

Purpose

Construction Support Services contracts provide temporary buildings and utilities, roadway maintenance, rodent control, trash removal, security, and other facilities and services necessary to support the construction effort for the Boston Harbor Project. Providing centralized support facilities and services avoids potential coordination problems which could occur if contractors were responsible for their own utilities, transportation, and maintenance. The total estimated cost of the 51 construction support services contracts is $85.6 million.

Expenditure Forecast and Schedule

Construction Package	Contract	Total Contract Amount ($000)	Begin date	End date
N/A	Technical Assistance	$374	NA	NA
N/A	Construction Power	$12,740	Jan 90	Dec 99
N/A	Construction Water	$2,164	Jul 91	Dec 99
N/A	Interim Utilities	$1,217	Oct 94	Mar 97
CP-901 (complete)	Construction Support Building	$4,067	Sep 90	Jul 91
CP-902 (complete)	Construction Roads & Utilities	$5,153	Nov 90	Jan 92
CP-903 (complete)	Fuel Facility	$1,665	Oct 90	Sep 91
CP-904 (complete)	Fuel Supplier I	$126	Jul 90	May 92
CP-920 (complete)	Fuel Supplier II	$50	Jun 92	Aug 96
CP-924	Fuel Supplier III	$400	Aug 96	Dec 98
CP-909 (complete)	Security I	$198	Oct 89	Oct 90
CP-917 (complete)	Security II	$1,196	Nov 90	Dec 92

CP-930 (complete)	Security III	$1,233	Dec 92	Dec 94
CP-935	Security IV	$1,327	Jan 95	Dec 96
CP-942	Security V	$2,116	Jan 97	Mar 00
CP-910 (complete)	Site & Fore River Staging Area Maintenance	$1,898	Oct 90	Nov 92
CP-931 (complete)	Site & Fore River Staging Area Maintenance II	$2,476	Nov 92	Nov 94
CP-936	Site & Fore River Staging Area Maintenance III	$3,538	Nov 94	Nov 96
CP-943	Site & Fore River Staging Area Maintenance IV	$4,290	Nov 96	Dec 98
CP-970	Site & Fore River Staging Area Maintenance V	$2,491	Jan 99	Dec 00
CP-911 (complete)	Trash Disposal Deer Island / Fore River Staging Area	$852	Jul 90	Jul 93
CP-933 (complete)	Trash Handling & Disposal II	$954	Jun 93	Jun 95
CP-938	Trash Handling & Disposal III	$852	Jul 95	Jun 97
CP-944	Trash Handling & Disposal IV	$808	Jul 97	Dec 99
CP-912 (complete)	Off-Site Maintenance & Construction Support Building Housekeeping	$205	Dec 90	Jan 93
CP-934 (complete)	Off-Site Maintenance & Construction Support Building Housekeeping II	$315	Feb 93	Feb 95
CP-939	Off-Site Maintenance & Construction Support Building Housekeeping III	$441	Feb 95	Feb 97
CP-945	Off-Site Maintenance & Construction Support Building Housekeeping IV	$443	Feb 97	Feb 99
CP-972	Off-Site Maintenance & Construction Support Building Housekeeping V	$383	Jan 99	Dec 00

CP-950 (complete)	Construction Support Labor	$735	Aug 91	Aug 92
CP-951 (complete)	Construction Support Labor-II	$3,992	Aug 92	Jul 93
CP-952 (complete)	Construction Support Labor-III	$5,855	Jul 93	Jul 95
CP-953	Construction Support Labor-IV	$5,796	Aug 95	Jul 97
CP-954	Construction Support Labor-V	$3,000	Aug 97	Jul 99
N/A	Construction Services	$2,000	Aug 95	Sep 96
CP-960 (complete)	Construction Support Labor - Electrical	$909	May 93	May 95
CP-961	Construction Support Labor - Plumbing	$572	Jul 94	Jun 96
CP-962 (complete)	Construction Support Labor-HVAC	$409	Apr 94	Apr 96
CP-963	Construction Support Labor - Electrical II	$994	Jul 95	Aug 96
CP-964	Construction Support Labor - Plumbing II	$1,000	Jun 96	Jun 99
CP-965	Construction Support Labor - HVAC II	$992	May 96	May 99
CP-968	Construction Support Labor - Electrical III	$1,794	Aug 96	Aug 98
CP-969	Construction Support Labor - Electrical IV	$1,000	Aug 98	Dec 00
CP-922 (complete)	Off-site Snow Related Services & Asphalt Sweeping	$134	Oct 90	Nov 92
CP-932 (complete)	Off-site Snow Related Services & Asphalt Sweeping II	$589	Nov 92	Dec 94
CP-937	Off-site Snow Related Services & Asphalt Sweeping III	$610	Jan 95	May 97

CP-946	Off-site Snow Related Services & Asphalt Sweeping IV	$575	May 97	Jun 99
CP-973	Off-site Snow Related Services & Asphalt Sweeping V	$431	Jul 99	Dec 00
CP-913 (complete)	Rodent Control	$34	Jul 89	Jul 91
CP-919 (complete)	Rodent Control II	$134	Sep 91	Sep 95
CP-947	Rodent Control III	$41	Jan 96	Dec 99
	TOTAL:	$85,568		

The following narrative provides descriptions only for active contracts in this phase.

Construction Power

Each construction contractor operating on the island requires electricity to operate equipment, and for other purposes. The MWRA pays directly for the power consumed during the course of construction, resulting in lower overhead costs.

Construction Water

The Authority pays directly for water required by the construction contractors.

Interim Utilities

The thermal plant (CP-428), which will provide heat for the new plant, was not available to support the start-up of the first two batteries of primary treatment. Temporary boilers and generators were installed to provide heat and thermal energy until the permanent thermal plant is operational in 1997.

Fuel Supplier I (CP-904)
Fuel Supplier II (CP-920)
Fuel Supplier III (CP-924)

Approximately one million gallons of fuel were consumed on Deer Island per year during the period of peak construction (1993 - 1994), and a significant volume of fuel will be required throughout the duration of the project. The first fuel supplier contract (CP-904) provided fuel to BHP contractors on Deer Island from an interim fuel facility (1990-1992). In mid-1992 the CP-920 Fuel Supplier II contractor commenced a four-year contract (1992-1996) to supply fuel to Boston Harbor Project contractors, the construction support building, the Deer Island treatment plant buildings and vehicles, and to collect and remove used motor oils, hydraulic oils, and oil filters from contractors. Fuel Supplier II (CP-920) provides this service using the newly constructed Deer Island Fuel Facility and its own vehicles for on-island distribution of diesel fuel. Fuel Supplier III (CP-924) will provide this service for the duration of the project (1996-1999).

Security I, II, III, IV, and V (CP-909, 917, 930, 935, and 942)

During the course of construction there will be 25 to 35 field office trailers throughout Deer Island and Nut Island which contain office supplies and valuable equipment. There are also equipment maintenance areas and small tool sheds that contain expensive supplies.

To coordinate provision of security services, a centralized security system has been established. This system consists of five stages. The first stage involved a one-year contract (CP-909) to develop the overall security system plan. The second stage (CP-917) expanded the security system plan developed in stage one and provided security for two years ending December 1992. The third stage (CP-930) provided security services for two years ending in December 1994. The fourth phase (CP-935) commenced in 1994 and extends for two years ending in December 1996. The fifth phase (CP-942) will commence in 1996 and extends for the duration of the project.

The security contracts provide for security personnel stations and mobile patrols for Deer Island, Nut Island, the Suffolk Downs Bus Transportation Parking Facility, and the Squantum Point Water Transportation Parking Facility. Security headquarters is located on Deer Island. The contracts include provision for maintenance of project security records and investigation and reports of security and fire incidents at any of the sites described above.

Site and FRSA Maintenance I, II, III, IV, and V (CP-910, 931, 936, 943, and 970)

Temporary construction roadways and sanitary facilities must be maintained for the duration of BHP construction. Three contracts are required to provide this long-term maintenance. Services for the first two years (1990-1992) were provided through CP-910; services for the next two years (1992-1994) were provided through CP-931; services for the next two years (1994-1996) are being provided through CP-936; services for the next two years (1996-1998) will be provided through CP-943; and services thereafter (1998-2000) will be provided through CP-970. The services provided under these contracts include the following:

- Snow plowing and removal, and salt and sand spreading at FRSA and Deer Island.
- Maintenance of access roads, drainage systems, and common areas at Deer Island.
- Dust control for access roads and common areas at Deer Island.
- Street sweeper operation at FRSA, Deer Island, and Point Shirley.
- Single-unit portable toilets at Deer Island.
- Sewage holding tank pumping service and janitorial service for site toilet buildings on Deer Island.
- Monitoring of the trash facility and moving of 70-cubic yard trash trailers to and from the RO/RO pier on Deer Island.
- 55-gallon steel drum trash containers at FRSA and Deer Island.
- Common area cleanup services at FRSA and Deer Island.
- Miscellaneous cleanup services at Deer Island.

Trash Disposal Deer Island/FRSA (CP-911)
Trash Handling and Disposal II (CP-933)
Trash Handling and Disposal III (CP-938)
Trash Handling and Disposal IV (CP-944)

During the course of construction at Deer Island and the FRSA, there will be construction debris and non-hazardous solid waste which must be collected and disposed of properly. The trash contractors contain, haul, and dispose of non-hazardous solid waste and construction debris at an approved disposal site. These services were provided through CP-911 for the first three years (1990 to 1993), through CP-933 for the next two years (1993 to 1995), through CP-938 for the next two years (1995 to 1997), and will be provided through CP-944 thereafter (1997 to 1999).

The trash contractors are responsible for maintenance, inspection, and supervision of trash disposal equipment, services, and operations. All Deer Island trash trailers utilize the roll-on roll-off ferry.

Off-Site Maintenance and CSB Housekeeping I, II, III, IV, V (CP-912, 934, 939,945, and 972)
Off-Site Snow Related Service and Asphalt Sweeping I, II, III, IV, V (CP-922, 932, 937,946, and 973).

There are several off-site facilities that support construction at Deer Island and Nut Island which must be maintained. The facilities at Suffolk Downs, Mystic River, and Squantum Point require janitorial services, general cleanup, site maintenance, and landscaping maintenance. The Construction Support Building on Deer Island also requires janitorial services. In addition, these sites require snow removal and asphalt sweeping. These phases are being provided in three stages. The initial janitorial services, general cleanup, and landscape maintenance services were provided by CP-912, while CP-922 provided the road and parking lot snow service and asphalt sweeping. These services were provided through CP-932 and CP-934 through the end of 1994, and are being provided through CP-939 and CP-937 for the next three years (1995-1997). Hereafter (1997-2000), the services will be provided through CP-945, CP-946, CP-972, and CP-973.

Construction Support Labor Phase IV and V (CP-953 and 954)

The construction support labor contractor provides construction, reconstruction, renovation, reconditioning, installation, repair, and testing of construction support facilities and systems. Work is performed on an as-needed basis under work orders as directed by the Construction Manager (CM). Services may be performed at Deer Island, Nut Island, and all support and transportation sites. This may include work on the existing Deer Island Treatment Plant required due to construction. The first three phases of this contract (CP-950 from 1991-1992, CP-951 from 1992-1993, and CP-952 from 1993-1995) are complete. From 1995-1997 services are being provided through CP-953, and from 1997-1999 services will be provided through CP-954.

Construction and Design Services

Construction and Design Services cover those items that cannot be contractually added to existing construction packages. These include items identified during review programs such as Will it Work and System Integrity. The funding for the design of repairs to existing outfall 002 is also included.

Construction Support Labor - Electrical I, II, & III (CP-960, 963, 968, & 969)
Construction Support Labor - Plumbing I & II (CP-961 & 964)
Construction Support Labor - HVAC I & II (CP-962 & 965)

Chapter 149 construction support labor contracts provide building construction, reconstruction, renovation, remodeling, installation, repair, and testing of construction support buildings. Separate concurrent contracts are provided for electrical, plumbing, and HVAC work. Work is performed on an as- needed basis under work orders as directed by the CM. Services may be performed at Deer Island, Nut Island, and all support and transportation sites. This may include work on the existing Deer Island Treatment Plant required due to construction. CP-960, 961, 962 and 963 provided services through 1996. Thereafter, through 2000, services will be provided under CP-964, 965, 968, and 969.

Rodent Control I (CP-913)
Rodent Control II (CP-919)
Rodent Control III (CP-947)

A three-stage rodent control approach has been adopted for Deer Island. The first stage was a two-year contract (1989-1991) that preceded the Site Preparation I construction contracts. The goal was to eliminate as many rodents as possible before disrupting their natural habitats and to mitigate potential migration of rodents to public areas and abutting properties. The contractor furnished all labor, equipment, material, and supervision to perform a comprehensive and complete rodent control program. The second stage was a four-year maintenance program (1991-1995) to control rodents during the balance of major excavation on the island, including the period of time prior to and during demolition of the House of Correction. A third phase is included for control beyond 1995.

Construction Management

Purpose

This phase consists of contracts required to effectively support and manage the construction of the new treatment plant and residual facilities. The provision of consultant services for program and construction management, as well as facilities and job training are included. The phase also includes an insurance program and start-up services. The total cost of Construction Management services is estimated to be $349.9 million.

Expenditure Forecast and Schedule

Contract	Total Contract Amount ($000)	Begin date	End date
P/CM Services (complete)	$18,354	Apr 88	Jun 91
CM Services (90-98)	$247,158	Aug 90	Dec 98
CM Services (99-2004)	$15,532	Jan 99	Dec 04
Facilities Training	$3,575	Jul 90	Jun 00
Project Offices	$6,083	Jul 88	Jun 98
Management Support Services	$505	Jul 88	Jul 90
Consultant Computers	$600	Nov 88	Sep 95
Job Training (complete)	$2,392	Jul 90	Sep 93
Legal Lien Fees (complete)	$63	Jan 89	Jun 93
Professional Services	$4,992	Oct 89	Jun 00
Insurance General Liability	$2,334	Jan 90	Jun 00
Insurance Builders Risk	$6,485	Jan 90	Jun 00
Insurance Marine Liability	$422	Jan 90	Jun 96
Risk Management	$377	Sep 88	Dec 99

Labor Agreement Administrative Services	$3,078	Jan 90	Jun 00
Permit Fees	$707	Jan 90	Dec 99
Outfall Administration	$3,017	Aug 90	Jun 97
Outfall Permits	$100	Jul 90	Jan 98
Outfall Start-up	$10,000	Jan 98	Aug 98
Winthrop Easements (complete)	$1,000	Jan 93	Dec 95
Building Permits	$3,500	Jul 91	Jun 98
Miscellaneous Facility Support	$3,466	Sep 91	Jun 00
Winthrop Road Reconstruction	$1,602	Aug 93	Aug 94
MBE/WBE Assistance	$250	Jul 96	Dec 96
Construction Safety	$1,914	Apr 92	Jun 99
FO/RS-Rolling Stock	$4,810	Mar 93	Jun 99
FO/RS-Furnishings	$1,713	Mar 93	Jun 99
FO/RS-Shop & Maintenance Equipment	$1,770	Mar 93	Jun 99
FO/RS-Lab Equipment	$2,526	Mar 93	Jun 99
FO/RS-Audio/Visual Supplies	$158	Aug 93	Jun 99
FO/RS-Miscellaneous Fit Out Supplies	$1,377	Mar 93	Jun 99
TOTAL:	$349,860		

Program/Construction Management (P/CM) Services

The P/CM provided primary day-to-day program management for the project during the pre-construction period from April 1988 to December 1990. Program management included constructability, review of design, oversight of cost estimating, program coordination and scheduling, community relations, permitting, water transportation, bulk materials handling, value engineering, prepurchase of equipment and materials, construction planning, facility testing, start-up, and staff training. In addition, the P/CM provided technical support for agency decisions regarding contractor selection, change order control, progress payments, and final acceptance.

Construction Management (CM) Services I and Additional Resident Inspection (1990-1998)

MWRA awarded the contract for Construction Management Services to ICF Kaiser Engineers Massachusetts, Inc. (ICF-KE). There was a six-month transition period between the P/CM and CM contracts, from July 13, 1990 to December 31, 1990. MWRA has three three-year options to extend the original CM contract (1990-1995). The extension to the current contract, referred to as Phase II, is for services through the period of January 1996 through December 1998. The two CM line items, (1990-1995) and (1996-1998), were combined into one line item (1990-1998) to reflect a continuing single contract with the CM.

The CM is responsible for all BHP construction management and support activities through the end of the project. The CM team provides services in program support, construction management, and quality assurance/quality control.

Program support includes project management, project controls, information systems, contracts management and administration, project promotion, risk management, and job training.

Construction management includes those services directly related to the management and support of all BHP construction activities. The CM provides construction and site management, resident engineering and inspection services, contract bid support, logistical management, industrial relations, safety management, substance abuse prevention, and facilities management and support of Deer Island construction facilities. Other services include engineering support and coordination with design engineers during construction and start-up phases of the project, shop drawing administration, record drawings, operational support, and management of a limited number of design activities.

Quality assurance/quality control includes the development and management of an overall program to assure and control quality. The CM also provides design review services in constructability, operability, and value engineering areas. Survey and field coordination, regulatory support, mitigation compliance, and environmental compliance services are also provided by the CM.

Construction Management (CM) (1999-2004)

The option to extend this contract again may be utilized as additional CM and resident engineering and inspection services may be required which are not part of the scope of services currently being provided by the CM.

Facilities Training

Facilities training is the training and assistance required to operate the new treatment plant and laboratory, and to meet all state and federal performance standards. Approximately 500 treatment plant and laboratory employees, and 21 Nut Island Headworks employees were trained under this phase. These staff are learning to operate the new plant equipment and facilities in accordance with standard operating procedures, and to manage and administer the plant safely and efficiently. Training is also being provided for the facility information system and the technical laboratory.

Project Office

The project offices for the Construction Manager and the Lead Design Engineer are located at the Schrafft's Center in Charlestown, the Fore River Staging Area, Deer Island, Nut Island, Suffolk Downs, and Squantum Point, and provide space for 300 to 350 personnel. The budget for these offices includes estimated charges for telephone services, copying equipment, leases, and utilities.

Management Support System (MSS)

The Management Support System is comprised of hardware, software, and support services to facilitate project management of all Deer Island construction and design activities. The project management, information management, and data/statistical analysis functions provide the ability to control costs and schedules and to facilitate access to information.

Consultant Computers

This contract includes provision of computer support and tools for the project on an as-needed basis. These support tools include hardware, maintenance, database, automated desktop tools, desktop publishing, network support, and graphics software packages.

Job Training

A comprehensive, multi-phased training program has been designed and implemented for the staff at Deer and Nut Island facilities. The purpose of this training is to prepare the current work force for complex, technical jobs in the new plant and to provide essential preparation for plant-specific facilities training.

Additional training activities are designed to prepare women and minorities to enter apprenticeship programs and qualify for construction jobs; to introduce women and minorities to careers in environmental planning, design, engineering, and construction management; and to recruit and prepare Winthrop residents for jobs at the new plant.

Legal Lien Fees

This item provides funds in support of easements, title searches, and other associated costs related to the installation of the water line through Revere, Chelsea, and Winthrop.

Professional Services

This line item provides, or has provided for the following services:

- Economic Impact Analysis
- Winthrop Roads Consultant
- Appraisal Services
- Bus Route Consultant
- Suffolk County House of Correction Memorandum of Understanding
- Printing of Bid Specifications
- Office Trailers
- Miscellaneous Professional Services
- Litigation Costs

Risk Management Program

The main objectives of the Risk Management Program are to protect the assets and financial well-being of the Authority, to achieve optimum contractor responsibility and accountability, and to minimize the overall cost of the program.

The major components of the Risk Management Program are risk control and insurance. The risk control program includes a safety program, which includes the development of a safety manual, mandatory training by contractors of all staff working at the construction site, and creation of an executive committee comprised of MWRA and CM personnel to ensure that the program is comprehensive and effective. Risk control also includes a risk transfer program with commercial insurance and risk sharing provisions, such as contractors contractually sharing in the deductible portions of insured property losses. The risk control program also includes a reserves program, which established a fund to protect the MWRA from non-insured losses. Contractually, contractors and consultants are required to provide certain insurance which may include Workers' Compensation, General Liability, Marine Liability, and Automobile Liability Insurance.

Excess General and Excess Marine Liability

The purpose of excess general and marine insurance is to provide adequate coverage for the MWRA in case of catastrophic occurrences. Construction contractors are required to provide basic general liability insurance. The personnel and materials transport operators, and contractors with marine operations, are required to provide $5 million of marine insurance. The excess general and marine liability program provides coverage for the MWRA and the construction manager.

Builder's Risk Insurance

The purpose of Builder's Risk insurance is to provide coverage in the event of property losses during construction of the Boston Harbor Project. Builder's Risk insurance provides coverage for the MWRA and BHP construction contractors for materials and equipment either stored at the site, at approved off-site locations, or in transit to the site. In order to keep the insured contractors responsible and accountable, the MWRA has structured a deductible program whereby construction contractors are responsible for the first 50 percent of applicable deductibles.

Labor Agreement Administration Services

The Boston Harbor Project Labor Agreement (BHPLA) was established to ensure labor harmony and stability among the various skilled trade organizations and contractors throughout construction of the new treatment facilities. The BHPLA supports timely and successful completion of the treatment facilities by providing efficient dispute resolution mechanisms to resolve grievances without work slowdowns or stoppages. On March 8, 1993, the U.S. Supreme Court ruled unanimously in favor of an appeal sought by the MWRA and the AFL-CIO upholding the legality of the agreement. The Court's ruling re-affirmed the original ruling by the Federal District Court and overturned rulings by the First Circuit Court of Appeals. The Supreme Court gave local agencies, including MWRA, the same right private property owners already had to impose uniform labor agreements on all contractors in large projects.

Permit Fees

This line item includes fees for environmental permit acquisition and inspections for the following permit related activities:

- Hazardous Waste Oversight
- Air Quality Plans Approval
- Hazardous Waste Compliance Inspection
- Water Cross Connection Compliance
- Groundwater Discharge Compliance
- Registry of Deeds (Permit Recording Fees)
- Marine Oil Terminal
- National Pollution Discharge Elimination System
- Annual DEP Compliance
- Newspaper Advertisements
- Wetlands Protection Act Application
- DEP Water Quality Certifications
- DEP Chapter 91 Waterways Applications

The Commonwealth of Massachusetts recently enacted a new fee structure for Wetlands Protection Act permit applications. In the past, a standard $25 fee was required for a Notice of Intent for any project. Now, the fee is calculated based on the type of work and its location with reference to specific natural coastal resources, such as a beach or bank. Application fees now range from $50 to $10,000 per project.

Outfall Administration

In order to facilitate the construction of the effluent outfall tunnel and diffusers, a Disputes Review Board (DRB) was established. This board ensures equitable and timely resolution of all disputes between the MWRA and the contractors building the effluent outfall tunnel and diffusers. The Outfall Administration contract provides administrative and legal services required for the DRB.

Outfall Permits

The State Department of Public Safety may require the MWRA to pay for a permit for the effluent outfall tunnel. This item has been budgeted to cover the cost of the potential permit and is still under review.

Outfall Start-Up

The current outfall construction contract will end when the tunnel construction is complete and the tunnel is filled with chlorinated seawater. The outfall must then be "started up", which will include beginning flow through the tunnel, removal of the diffuser caps, and fine tuning of the system for proper operation. The start-up contractor will perform services necessary to accomplish this task.

Winthrop Easements

This contract covers any easements and land purchases required for routing the utility lines (CP-401) through Winthrop.

Building Permits

The MWRA must acquire building permits for any buildings or structures under the jurisdiction of the state building code. Most BHP contracts include construction of public buildings which require building permits. The Department of Public Safety's review and permitting process ensures the structural integrity and safety of the buildings and structures. State law requires the payment of a fee to the department.

Miscellaneous Facilities Support

This contract includes repair of city streets and private roads in Quincy and police detail at Revere Sugar and Squantum Point. Additional traffic signals at FRSA, safety and emergency services in Winthrop, and the Belle Isle Marsh Study are also included.

MBE/WBE Assistance

The MWRA has established a professional services contract with a consultant to provide pre- and post-contract award technical assistance services to minority business and/or women business enterprises (MBE/WBE).

Construction Safety

An Emergency Tunnel Response Team and a safety consultant to review the Boston Harbor Project safety program are provided through this contract.

Fit-Out

Fit-Out is the program which provides non-construction related items necessary for start-up and operation of the new treatment plant. This program is categorized by specific line items including rolling stock, furnishings, shop and maintenance equipment, laboratory equipment, audio-visual supplies, and miscellaneous consumable supplies. Detailed descriptions are below.

Initially, fit-out plans at similar facilities in Washington D.C., Detroit, Baltimore, and Minneapolis/St. Paul were evaluated and adapted to Deer Island facilities based on the Plan of Operations. Industrial engineering and value engineering reviews were conducted on the initial estimates. The overall focus of these reviews was to consolidate purchasing, not only as a cost saving measure, but also to conserve space. The proposed equipment has been specified based primarily on function, durability, and life cycle value. All Fit-Out items are competitively procured by the MWRA.

Fit-Out - Rolling Stock

Rolling Stock includes all mobile plant equipment, such as pick-up trucks and cranes, industrial tricycles for journeymen, and mobile pumps for cleaning and maintenance.

Fit-Out - Furnishings

Furniture quantities are based on the Deer Island staffing plan in which offices, work stations, and maintenance shops are outfitted with desks, chairs, tables, shelving, and other required furniture. Furniture is specified for durability, flexibility, and strength.

Fit-Out - Shop and Maintenance Equipment

This category of Fit-Out is for the purchase of machinery, lathes, drill presses, and other equipment to maintain the new plant. Equipment specifications are based on durability and ease of use, and are designed to accommodate process equipment items specified for Deer Island.

Fit-Out - Laboratory Equipment

This category of Fit-Out/Rolling Stock is for the purchase of analytical and support equipment to test the various treatment plant processes to demonstrate compliance with the effluent discharge permit. Additional laboratory equipment has been purchased for central wastewater testing needs previously provided by private laboratories, at an approximate annual cost of $3 million.

Fit-Out - Audio-Visual/Supplies

This category of Fit-Out/Rolling Stock is for the purchase of dry marker boards, overhead projectors, and other supplies to support training of plant staff. In addition to overhead and slide projectors, video recorders and monitors will allow for repeats of certain training modules to successive classes and remote training in other plants without training staff support.

Fit-Out - Miscellaneous Fit-Out Supplies

This category of Fit-Out/Rolling Stock is for the purchase of safety equipment, small tools, and first fills of equipment and supplies such as piping and other raw materials.

Lead Design Services

Purpose

This phase consists of the contracts required to develop, manage, and support the design of the new treatment plant and residual facilities. The total estimated cost of Lead Design Services, including the initial concept design, is $108.7 million.

Expenditure Forecast and Schedule

Contract	Total Contract Amount ($000)	Begin date	End date
LDE Services	$87,011	Aug 88	Dec 98
CADD I (complete)	$5,475	Aug 88	Mar 93
CADD II	$3,554	Jul 89	Jun 99
Geotechnical Services (complete)	$9,707	May 89	Oct 89
Engineering Services During Construction	$2,950	Apr 93	Jun 99
TOTAL:	$108,697		

Lead Design Engineer (LDE) Services

The LDE has primary responsibility for the overall design of the primary and secondary treatment facilities including the tunnels and on-site residuals management facilities. The LDE develops design criteria and standards, provides drawings and outline specifications at the 15-20 percent completion level for all facilities, and provides oversight management of all design work. The LDE also provides engineering services during construction (ESDC), focusing on the integrity of plant-wide systems which contain components designed by a variety of firms. The LDE is managed from an overall program perspective by the CM, with emphasis on schedule, budget, constructability, and operability issues.

The LDE also performs ESDC services for certain facilities it completed the detailed design for. Under the ESDC program, the LDE will ensure complete and proper review and coordination of design changes that impact plant-wide systems. This is accomplished through review of selected contractor submittals to address compatibility with plant-wide systems and maintenance. Various engineering models, plans, and documentation are also updated during construction to enable continued engineering coordination of facilities under construction.

The LDE contract also includes detailed design services for those facilities requiring early completion. These services were separate from LDE responsibilities and were performed by different staff. In this capacity, this separate staff functioned as a Project Design Engineer (PDE) and was managed by and reported to the LDE. During construction, this PDE provides traditional engineering services during construction and is managed by the CM.

Computer Aided Design and Drafting/Database (CADD I and II)

The MWRA has procured a single standardized Computer Aided Design and Drafting (CADD) system to ensure a cost-effective, functional, and integrated design and construction effort. This CADD system is used by most of the project design firms and the CM. The system consists of customized CADD software (using discipline-specific design applications and associated project libraries), computer processing units (CPUs), work stations/terminals, and related peripherals. In particular, CADD facilitates design and construction management in the following areas:

> Site Control: Site management and coordination on Deer Island is critical because of the limited size and congested nature of the site, as well as the need to continue operation of the existing plant during the construction period. The contract limits of the 40 plus construction contractors and the site infrastructure (roads, utilities, buildings, and topography) are continually updated, monitored, and controlled using the CADD system as a tool. The design contract drawings are all produced using the project coordinate grid for uniformity and interface control between contracts.
>
> Uniform Drafting Standards: There are 32 design contracts performed by approximately 20 engineering and architectural firms. Uniform drafting standards among all designers are necessary to ensure consistent drawing development practices.
>
> Standard Identification System: An estimated 30,000-40,000 discrete components are identified consistently in the drawings to enable contractors, the CM, and MWRA personnel to use a common method to identify and refer to these individual plant components.

Standard Component Data: A database management system is integrated with the CADD system to record and update equipment information for use during the design and construction phases. The system is adaptable for continued use of this information during plant operations.

Geotechnical Services

Geotechnical services provided geotechnical data along the Inter-Island Tunnel, the Outfall Tunnel, and diffuser alignments to assist in the silting and construction of the tunnels. These services consisted of drilling borings through the ocean floor into bedrock, retrieving soil and rock samples for recording and analysis to facilitate design of the tunnels, and providing geotechnical information for consideration by tunnel designers and contractors.

Engineering Services During Construction (ESDC)

Each Project Design Engineer (PDE) performs engineering services during construction for the elements of the project they designed. This consists of technical submittal review, Change Clarification Request/Non-Conformance Request (CCR/NCR) reviews, and progress reports and administration.

The PDEs review contractors' technical submittals such as shop drawings, installation procedures, material certifications, and testing procedures and results to ensure that the contractors meet the technical requirements and the design intent of the contracts. The PDEs also track and monitor design changes made during construction to ensure that design documents clearly show these changes to the contractors.

1205. Water Transportation Facilities

Purpose

The construction of new primary and secondary treatment facilities at Deer Island and the conversion of the Nut Island Treatment Plant to a headworks facility are large, multi-year construction projects at sites which have limited land access. MWRA has developed a transportation system to mitigate the impacts of transporting construction crews, materials, and vehicles, and to provide timely access and egress to the sites. The system transports all materials, equipment, and approximately 50 percent of construction personnel to and from the construction sites on Deer Island to avoid travel through the adjacent communities. The transport system includes ferry and barging services from the Fore River Staging Area (FRSA) in Quincy to Deer Island and barging services directly to and from Nut Island. It also includes bus service to Deer Island for approximately 50 percent of the construction work force.

The water transport system has required construction of staging facilities, piers, and terminals and the procurement of transport operating services at a total estimated cost of $250.1 million.

For purposes of capital budgeting and project organization, Water Transportation Facilities is comprised of the eight phases listed in the table below, followed by a description of the scope for current construction and transport contracts.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Deer Island (complete)	$34,395	Jun 88	Nov 91
Fore River Staging Area (FRSA)	$66,019	Jan 88	Jun 99
Squantum Point	$9,179	Jan 90	Dec 99
Revere Sugar (complete)	$5,160	Aug 88	Oct 94
Nut Island (complete)	$6,198	Jan 89	Feb 91
Design (complete)	$7,747	Apr 87	Jun 93
Water Transportation System Operations	$111,819	Nov 89	Dec 00
Other Water Transportation System Operations	$9,604	Jan 88	May 99
TOTAL:	$250,121		

FRSA Utilities

Each construction contractor using the FRSA for staging consumes water, gas, and electricity. MWRA pays directly for the utilities consumed during the course of construction, resulting in lower overhead costs. This contract also includes the costs of heating and providing power to the staging buildings constructed under CPs 012 and 017, and power required by the RO/RO operator.

Squantum Point Maintenance
Squantum Point Lease

For construction workers commuting from the south and west of Boston, ferry service is provided from Squantum Point in Quincy. In previously completed contracts, MWRA dredged the channel, and constructed a pier, a gangway, floats, and a secure parking area. MWRA entered into an agreement with the MDC to design this facility in a manner consistent with the MDC's long-term development plan and to provide public access to Squantum Point at all times. Lighting and fencing has been installed. General maintenance and housekeeping on the floating pier, gangways, and access ramps is provided, including snow removal, de-icing, cleanup, and minor repairs.

Bus Transportation System (1989-1997) (CP-908)
Bus Transportation System (1998-2000) (CP-927)

The land transport system for construction workers is based at Suffolk Downs in Revere. A private bus transportation operator maintains the buses to transport workers to and from Deer Island.

Water Transportation System - Personnel (1989-1997) (CP-918)
Water Transportation System - Personnel (1998-2000) (CP-926)

The personnel transport system employs a private operator to provide and operate the vessels required for ferry service to Deer Island. The ferry service operates primarily from the Squantum Point and Rowes Wharf sites and covers all three construction shifts, with the majority of trips during the day.

The original contract was for five years, followed by two, two-year renewal options, the first of which has been exercised, extending services through 1997. In addition to the vessels used to transport authorized personnel between the on-shore facilities and Deer Island, the operator supplies an on-call water taxi service for transport of personnel and delivery of small packages.

Water Transportation System - RO/RO Transport (1989-1997) (CP-907)
Water Transportation System - RO/RO Transport (1998-2000) (CP-925)

A private operator provides and operates vessels for transport of construction materials, equipment, and vehicles to and from Deer Island. The materials transport operator manages the Fore River Staging Area queue, the roll on/roll off piers, the transport vessels, and the Deer Island receiving area. The transport system operates five days per week for approximately 250 days per year. Materials transport began in June 1990.

The materials transport operator was awarded an initial five-year contract followed by two, two-year renewal options. The operator is required to provide and operate a sufficient number of vessels to transport all scheduled vehicles between FRSA and Deer Island.

Rowes Wharf Permit

The MWRA has an agreement with the Rowes Wharf Operations Board that allows the Authority to operate a water shuttle to pick up and drop off passengers at the existing pier. Passengers are authorized personnel including construction workers, site engineers, MWRA staff, and regulatory agency staff.

1301. Residuals Management Facilities

Purpose

Residuals, which are by-products of wastewater treatment processes, must be managed in an environmentally sound manner in order to comply with state and federal regulations. Improved management of residuals is critical to the Boston Harbor Project and is a key element in the federal court schedule.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Research/License Fee/Royalty	$1,680	Aug 90	Jan 03
Design/RI/Construction Services	$5,942	Aug 93	Aug 98
Construction	$48,513	Aug 94	Aug 98
TOTAL:	$56,135		

Project History and Background

MWRA ceased the discharge of sludge and scum into Boston Harbor in December 1991. Interim and long-term treatment alternatives have been developed to manage these residuals of the wastewater treatment process.

An interim sludge processing and disposal phase included the construction and operation of sludge handling facilities at Deer Island, Nut Island, and the Fore River Staging Area (FRSA). The processing facility at the FRSA has four process trains and is equipped with air pollution and odor control equipment. MWRA completed construction of these facilities and began operations in December 1991. As required by federal court order, MWRA was responsible for ending the discharge of sludge into Boston Harbor.

MWRA owns the sludge dewatering and drying facilities at the Fore River Staging Area (FRSA). A private contractor, the New England Fertilizer Company (NEFCO), has been engaged to haul sludge by barge to the FRSA, operate the facility, and market and or dispose of the final product.

This approach provides MWRA with ownership of the processing facilities and reserves the option of operating the facilities in the future.

MWRA is modifying and expanding the sludge processing facilities to accommodate the increased sludge volumes expected to be generated by the start-up of secondary treatment at Deer Island. In addition, MWRA will construct two 14-inch sludge pipelines to convey sludge from the Deer Island Treatment Plant to the pelletizer facility at FRSA. One pipe is sized to convey peak sludge volume while the second pipe may act as a back-up for sludge transport or for filtrate return. The sludge pipeline construction budget and schedule are included in the Braintree-Weymouth Relief Facilities project.

In 1993, MWRA sought and received approval for modification of the Residuals Management Facilities Plan. The modification substituted commercial disposal of wastewater residuals for immediate construction and operation of a backup landfill in Walpole. A commercial disposal contract provides transportation and disposal services for wastewater treatment residuals for 30 years. The Residuals Disposal Alternatives Evaluation Committee evaluated the costs of commercial disposal services versus the construction and operation of the Walpole landfill and concluded that the cost of commercial disposal services would be equal to or less than the cost of constructing and operating the Walpole landfill. In addition, the capacity of the commercial facilities is much larger than that of the Walpole site. This increased capacity provides greater flexibility in the Authority's operation of its residuals program.

Finally, the commercial disposal services allow MWRA to fully comply with the requirements of the Clean Water Act. The cost of commercial disposal services is funded in the Current Expense Budget.

MWRA has developed an emergency preparedness plan which addresses potential interruptions in backup sludge disposal arrangements, and retains ownership of the Walpole site, so that it can construct the landfill without delay if that is deemed necessary.

Scope

Phase	Scope
Design/CS/RI Pelletizing	Evaluate the capacity of the existing pelletizing plant and use the solids quantity projections derived from the Deer Island pilot plant and other design studies to make a decision on the scope of the expansion. Design of instrumentation and control updates, additional permitting and air emissions requirements, and design of pellet coating, chemical feed, and ventilation/RTO manifold systems

Fast Track Equipment Prepurchase	Prepurchase of two pellet coolers and screens.
Fast Track Equipment Installation	Installation of new safety and process equipment, two new screens, and a pelletizer air recirculation/scrubbing system.
Outside Construction	Work to be completed outside the pelletizing building including Pier 2 rehabilitation, additional rail tracks, an extension to the existing cake loadout garage, additional pellet silos, increased pneumatic transport capacity, and demolition of crane.
Inside Equipment Prepurchase	Prepurchase of 12 centrifuges for dewatering sludge. Maintenance service agreement for centrifuges has been removed from the CIP and will now be funded through CEB. Additional equipment storage insurance costs and acceptance of the equipment upon delivery to the MWRA approved site.
Inside Construction	Work to be completed inside the facility consists of dewatering equipment replacement, modifications to the four existing pelletizing trains, and installation of two new pelletizing trains. Some outside building and utility modifications are also included. Explosion suppression systems, cooling towers, air compressors, pellet coating, chemical feed, and ventilation/RTO manifold systems.
Residuals Research	Study the appropriate application methods, environmental impacts, and agronomic benefits of MWRA's fertilizer in a variety of settings and investigate the cause of pellet self-heating and other microbial activity in the material. Study results aided in developing recommendations for product use, answering questions about environmental suitability, and developing marketing strategies.
License Fee	License fees may be due to a patent holder, Enviro-gro, when NEFCO stops operating the facility.
Royalty Payment	Payment to the holder of the residual process patent.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB line item	FY99	FY00	FY01	FY02	Description
Chemicals and Utilities	$2,425,132	($53,325)	$994,944	($820,662)	Due to projected increases in sludge volume associated with the commencement of D.I. Secondary B in February 1998, Secondary C in July 2000, and water treatment plant residuals in FY2002. All dryers will be modified by FY99.
Maintenance	$444,110	$85,954	$229,463	$257,102	Required to support an increase in necessary equipment and additional usage associated with increase in sludge volume.
Other	$3,294,056	$380,553	$1,679,727	$983,800	Increase in contract costs for plant operator due to increased sludge volume.
TOTAL:	$6,163,298	$413,182	$2,904,134	$420,240	

1401. Combined Sewer Overflow Control Program

Purpose

Portions of the tributary area served by the MWRA sewerage system are served by combined sewers. During heavy rainstorms, sanitary and storm flows exceed the capacity of the collection pipes. The excess, untreated, combined sewage is discharged to nearby receiving waters through 81 permitted outfalls. These discharges, known as combined sewer overflows (CSO), contribute a variety of pollutants that impact local beaches and marine and riverine habitats.

The primary objective of the CSO Program is to develop and implement wastewater system improvements that control the volume, frequency, and/or pollutant loading of CSO discharges in compliance with the Federal Clean Water Act and the Commonwealth of Massachusetts Water Quality Standards and in accordance with federal and state CSO policies and guidelines.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study/Modeling	$28,825	Mar 88	Oct 99
Design/RI/Construction Services	$66,968	Jan 95	Nov 08
Construction	$334,858	Jul 97	Nov 08
System Optimization Plans (SOP) Implementation	$4,733	Jan 94	Jun 00
Land/Easement	$15,000	Jul 96	Jun 05
Technical Assist./Technical Review	$824	Mar 86	Dec 09
Financial Audit	$1,500	Apr 98	Sep 09
TOTAL:	$452,708		

Project History and Background

Modern wastewater collection systems consist of separate pipelines to carry sewage and stormwater flows. In older regions of the country, including parts of metropolitan Boston, one pipeline system combines and transports these flows. Combined sewers are designed to carry dry weather flows (sanitary flows) and a portion of the storm flow.

During larger storms, when sanitary and storm flows exceed the capacity of the pipes, the combined sewer system is designed to allow the excess, untreated combined sewage to discharge through relief conduits to nearby receiving waters, including Boston Harbor and its tributary rivers. These discharges, called combined sewer overflows, and the many outfalls at which they are discharged are typically referred to as CSOs.

In the MWRA service area, there are 81 permitted CSO outfalls, located in Boston, Cambridge, Chelsea, and Somerville. During heavier rainstorms, these CSOs discharge to Chelsea Creek, Alewife Brook, Dorchester Bay, Boston Harbor, and the Charles, Mystic, and Neponset Rivers. CSOs in the Boston area are typically activated by rainfall that exceeds 0.1-inch depth, which means that approximately 60 rainfall events per year can cause overflows.

CSO discharges contribute a variety of pollutants to local water bodies, primarily pathogenic microorganisms and floating debris. Affected beaches, which include L Street, Carson, Malibu, Tenean, Constitution, and Pleasure Bay beaches in Boston, are used by approximately 10,000 people per day during the summer months. CSO discharges also affect shellfish beds. Shellfish harvesting is prohibited or restricted in most of the shellfish beds in the Boston area due to contamination from CSOs and other pollution sources.

Scope

Phase	Scope
Consultant-Technical Assistance	Conduct preliminary planning services prior to and in support of the 1988-90 Facilities Planning/EIR efforts.
Planning/EIR	Conduct facilities planning and environmental review of CSO control alternatives. (1990 Recommended CSO Control Plan).
Master Planning	Improve the MWRA's understanding of the combined sewer and regional wastewater systems through system inspections, flow monitoring, water quality monitoring, and performance assessments; optimize the performance of the existing systems; reassess CSO control needs in the context of evolving EPA policy and a system master plan. (1994 CSO Conceptual Plan). Revise Facilities Plan/EIR accordingly.
Watershed Planning	Interact with and support external watershed planning efforts that may affect CSO control needs.
Modeling	Provide receiving water quality modeling support to the Master Planning efforts.
Design	Conduct design services to support the Construction phase.

System Optimization Plans (SOP) Implementation	Implement MWRA-proposed SOP measures at 150 locations within the four CSO community systems with funding arranged through financial assistance agreements between MWRA and the CSO communities. Under the agreements, the communities will construct the improvements and be reimbursed by the MWRA for most associated costs. The SOPs include installing or modifying weir structures, blocking overflows, replacing tide gates, increasing the size of dry weather connections, and diverting separate stormwater around regulators.
CS/RI	Provide construction services and resident inspection for Construction phase.
Construction	Construct CSO control facilities. Includes sewer separation, floatables controls, consolidation/storage conduits, interceptor relief, upgrading of existing CSO storage and treatment facilities, and new screening and disinfection facilities.
Land/Easement	Conduct land surveys, appraisal services, and acquisition of land and easements
Technical Review	Conduct as needed technical review of projects being implemented by MWRA or the CSO communities.
Financial Audit	Conduct bi-annual audit of expenses for projects implemented by the CSO communities.
Technical Assistance	Conduct geotechnical survey services to support the 1990 Facilities Plan/EIR.

Changes in Scope Since FY97-99

Phase	**Change**
Design/CS/RI phases	Reconsolidate some phases to reflect updated procurement strategy. Add estimated hazardous materials handing and disposal design costs.
Construction phases	Adjust phases to reflect design phase reconsolidation. Additional estimated hazardous materials handling and disposal costs, and revised cost estimates based on new specific site and geotechnical information.

Additional Project History and Background

MWRA Planning Efforts

In 1985, the U.S. Federal District Court, Massachusetts District, ruled that responsibility for CSOs in its service area in a stipulation entered into by the MWRA in Federal Court in 1987.

The first set of CSO milestones in the Court schedule included a requirement to conduct facilities planning and environmental review of CSO control alternatives. The Authority conducted this work in the period 1988-90 and completed a Facilities Plan and EIR in September 1990. The recommended control plan included construction of a deep tunnel storage system for most of the impacted receiving waters, with near surface storage proposed for Alewife Brook and limited sewer separation proposed in a few, small areas. The estimated capital cost of the plan, in 1990 dollars, was approximately $1.2 billion.

In 1991, MWRA developed a new planning phase that was intended to build on the 1990 study and address several critical issues, including the need for more extensive flow monitoring, primarily to examine the impact of ongoing system upgrades (e.g. fast track pumping improvements at Deer Island) on CSO frequency and volume, and the need to evaluate CSO control in the context of a broader wastewater system master plan. To respond to these needs, MWRA initiated CSO/System Master Plan activities in 1992. The Master Plan involved the following planning objectives:

- Improve the Authority's understanding of the combined sewer and regional wastewater systems through system inspections, flow monitoring, water quality monitoring, and performance assessments.

- Optimize the performance of the existing systems through relatively low cost, easily implemented structural and/or operational modifications.

- Reassess CSO control needs in the context of evolving EPA policy.

- Reassess CSO control needs in the context of a system master plan.

In 1994, MWRA completed a Baseline Water Quality Assessment document which examined the existing water quality in 14 receiving water segments affected by CSOs. These segments were characterized and distinguished based on geographical location, frequency, and volume of existing CSO discharges, and existing uses (i.e. fishing, swimming, shell fishing, boating, etc.). All of these activities and resources are also affected to some degree by pollution from separate stormwater discharges and other point and non-point sources. While CSO control will improve water quality, other sources of pollution may still cause violations of water quality standards. The Baseline Water Quality Assessment Report provides information on the loadings of various pollutants to these receiving waters from CSOs, separate stormwater, and upstream river sources.

Master Planning Recommendations

In December 1994, the MWRA submitted copies of its Final CSO Conceptual Plan and System Master Plan to the parties in compliance with Schedule Six of the Boston Harbor Case. The report presented MWRA's preliminary recommendations for CSO control. It also examined how, since 1987, many of the Authority's completed and ongoing projects to improve the wastewater collection, transport, and treatment systems have markedly reduced CSO discharges.

In October 1996, MWRA completed a Draft Facilities Plan and Environmental Impact Report (DEIR) which, building on the CSO Conceptual Plan, documented the more detailed engineering and planning evaluations and environmental impact assessments conducted since 1994, and presented an updated recommended plan for CSO control, including preferred project sites and routes. The DEIR was prepared primarily to satisfy federal and state CSO policy requirements, Massachusetts Environmental Policy Act (MEPA) regulations and Massachusetts Water Quality Standards requirements for the approval of CSO control plans.

The recommended projects in the DEIR, together with system optimization plans and major improvements already planned, designed or constructed in the collection and treatment systems, form MWRA's overall plan for long-term CSO control for Boston Harbor and its tributaries.

The recommended CSO projects, at an estimated total capital cost of approximately $420 million (design and construction), resulted from extensive hydraulic, water quality, cost, and site analyses conducted on a wide range of CSO control alternatives tailored to each receiving water segment.

The recommended CSO control plan focuses on the control of bacteria and floatables to increase swimming, shellfishing, and aesthetic/recreational uses of water bodies. Improvement of these uses through the control of bacteria and floatables is measured by reduction in the annual frequency of untreated combined sewer overflow events, as well as the reduction in the loading of these parameters. The recommended control levels are summarized as follows:

- Elimination of CSOs discharging to critical use (swimming and shellfishing) waters of Dorchester Bay, the Neponset River Estuary, and Constitution Beach.
- Reduction to an average of four or less untreated overflows per year in most of the other water bodies.

- Construction of two new CSO treatment facilities and upgrade of five of the six existing CSO treatment facilities (Cottage Farm, Prison Point, Somerville Marginal, Fox Point and Commercial Point) to treat CSO discharges that are predicted to activate more than four times per year on average. The sixth existing facility, Constitution Beach, will be decommissioned when the recommended sewer separation project for that area is completed. Fox Point and Commercial Point may also be decommissioned following longer term sewer separation projects.

The table at the end of this project narrative provides a complete listing of the recommended CSO projects and associated capital costs.

The revised plan is substantially different from MWRA's 1990 tunnel plan. Lower CSO flows, improved performance of MWRA's transport and treatment systems, and MWRA's receiving-water approach to CSO planning were the key factors in the development of a more cost-effective CSO control program.

The recommended CSO control plan was developed as a component of an overall System Master Plan, which also addressed I/I reduction, interceptor relief, and secondary treatment. As a result of this work, the report presents several conclusions:

- MWRA concluded that an overall moderate level of I/I control, at an estimated cost of $137 million, can be achieved from community infrastructure improvement and maintenance programs, the MWRA Financial Assistance Program, and its new flow-based wholesale sewer rate methodology. The overall result will be to improve the condition of the community and MWRA infrastructure and to preclude any additional increase in I/I flows within the system. The I/I conclusions and recommendations will be further addressed under MWRA's I/I Financial Assistance Program and other MWRA community I/I programs.

- MWRA identified hydraulic problems in its interceptor system and included recommendations to resolve these deficiencies. The Sewerage Division will incorporate these recommendations, estimated to cost up to $30 million, into its Comprehensive Long-Range Plan. System Master Plan (SMP) Interceptors project is based on these recommendations. Other proposed interceptor improvements, which primarily target structural problems, will also be incorporated into the comprehensive plan. The plan will establish priorities for implementation of the interceptor projects.

- Based upon the preliminary evaluations of secondary treatment capacity completed under the System Master Plan, the Authority determined that between two and two-thirds and three batteries (720 to 810 million gallons) of secondary treatment capacity were required at Deer Island, as opposed to the four batteries proposed in the 1988 Secondary Treatment Facilities Plan. These preliminary results were evaluated in more detail in a report issued under the Authority's DP-29 contract (Deer Island Concept Design Reassessment). In 1995, the federal court eliminated the need to build a fourth secondary treatment battery from the BHP.

A brief description of the water quality concerns, CSO control goals, and recommended projects follows:

North Dorchester Bay

North Dorchester Bay is classified SB-Fishable/Swimmable with restricted shell fishing in approved areas. Swimming beaches and shell fishing areas are considered to be critical/sensitive use areas in federal and state CSO policies. The CSO control goal is full attainment of beneficial use by eliminating all CSOs. CSO relocation is preferred over sewer separation, although the cost is similar, because sewer separation would introduce additional stormwater and its associated pollutant load to the receiving water.

Recommended Projects:
- Relocate CSOs to Reserved Channel to eliminate CSO outfalls BOS081-BOS087.
- Build CSO pumping facility on Reserved Channel.

South Dorchester Bay

South Dorchester Bay is classified SB-Fishable/Swimmable with restricted shell fishing. The CSO control goal is full attainment of beneficial use by eliminating all CSOs. Relocation of CSOs from this receiving water is not feasible.

Recommended Projects:
Short Term
- Upgrade Fox Point facility to dechlorination.
- Upgrade Commercial Point facility to dechlorination.

Long Term
- Separate sewers to eliminate CSO outfalls BOS088-BOS090. Decommission Fox Point and Commercial Point.

Neponset River

The Neponset River is classified SB-Fishable/Swimmable with restricted shell fishing. The CSO control goal is full attainment of beneficial use by eliminating all CSOs. Relocation of CSOs from this receiving water is not feasible.

Recommended Projects:
- Separate sewers to eliminate CSO outfalls BOS093-BOS095.

Constitution Beach

Constitution Beach is classified SB-Fishable/Swimmable with restricted shellfishing. The CSO control goal is full attainment of beneficial use by eliminating all CSOs. Relocation of CSOs from this receiving water is not feasible.

Recommended Projects:

- Separate sewers to eliminate CSO outfall BOS002.

Upper Charles River

The Upper Charles River is classified B-Fishable/Swimmable and other compatible uses. This section of the Charles River is subject to high recreational uses and heavy stormwater impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average and by treating more frequent overflows.

Recommended Projects:

- Relieve interceptor connection at outfall CAM005.
- Relieve interceptor connection at outfall BOS032.
- Install floatables controls at remaining outfalls.

Lower Charles River

The Lower Charles River is classified B-Fishable/Swimmable and other compatible uses and is subject to high recreational uses and heavy stormwater impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average, by treating more frequent overflows and by improving existing treatment.

Recommended Projects:

- Build screening and disinfection facility for Stony Brook flows (outfall MWR023).
- Upgrade Cottage Farm facility to dechlorination.
- Install floatables controls at remaining outfalls.
- Eliminate CSO outfalls MWR010 and BOS042.

Back Bay Fens

The Back Bay Fens is classified B-Fishable/Swimmable and other compatible uses. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average and treat these remaining flows.

Recommended Projects:

- Reduce CSO discharges at outfall BOS046. (The proposed screening and disinfection facility on Stony Brook is intended to treat BOS046 overflows as well as Stony Brook discharges to the Charles River.)

Alewife Brook

Alewife Brook is classified B-Fishable/Swimmable. The brook is subject to large stormwater impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to 4 or less events per year on average.

Recommended Projects:

- Separate sewers upstream of CAM002 and CAM004.
- Separate baffle manholes upstream of outfall SOM001.
- Install floatables controls at the eight remaining outfalls.

Upper Mystic River

The Upper Mystic River is classified B-Fishable/Swimmable. The Upper Mystic River is subject to large stormwater impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average.

Recommended Projects:
- Separate baffle manholes upstream of outfalls SOM006 and SOM007.

Mystic/Chelsea Confluence

The Mystic/Chelsea Confluence is classified SB-Fishable/Swimmable with restricted shell fishing. This water body is subject to industrial water uses and Mystic River discharge impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average, by treating more frequent overflows and by improving existing treatment.

Recommended Projects:
- Upgrade Somerville Marginal facility to dechlorination.
- Relieve Chelsea Branch Sewer and Revere Extension Sewer to reduce CSO overflows at outfall CHE008.
- Provide additional connections between MWRA and BWSC systems upstream of BOS017.
- Upgrade Chelsea-owned trunk sewer at outfalls CHE002-CHE004.
- Inspect/repair outfall CHE008.
- Install floatables controls at remaining outfalls.

Upper Inner Harbor

The Upper Inner Harbor is classified SB-Fishable/Swimmable with restricted shell fishing. This water body is subject to large impacts from stormwater and Charles River flows. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average, by treating more frequent overflows and by improving existing treatment.

Recommended Projects:
- Upgrade Prison Point facility to dechlorination.
- Build storage conduit at BOS019.
- Relieve East Boston Branch Sewer to reduce CSO overflows at outfalls BOS009-BOS013.
- Install floatables controls at remaining outfalls.

Lower Inner Harbor

The Lower Inner Harbor is classified SB-Fishable/Swimmable with restricted shell fishing. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to 4 or less events per year on average.

Recommended Projects:
- Relieve East Boston Branch sewer to reduce overflows at outfalls BOS003-BOS007.
- Install floatables controls at remaining outfalls.

Fort Point Channel

The Fort Point Channel is classified SB-Fishable/Swimmable with restricted shell fishing. This water body is subject to high commercial/industrial use, high stormwater impacts and high CSO impacts. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average and treating more frequent overflows.

Recommended Projects:
- Build detention/treatment facility for Union Park Pump Station flows.
- Build a consolidation/storage conduit to reduce overflows at outfalls BOS072-BOS073.
- Install floatables controls at remaining outfalls.

Reserved Channel

The Reserved Channel is classified SB-Fishable/Swimmable with restricted shell fishing. This water body is subject to high commercial/industrial use. Under the CSO Plan, it will receive relocated CSOs from North Dorchester Bay. The CSO control goal is to attain beneficial uses for most of the year by reducing untreated CSOs to four or less events per year on average and treating these remaining overflows.

Recommended Projects:
- Build a consolidation/storage conduit to the proposed pumping facility (see North Dorchester Bay, above) to reduce overflows at BOS076-BOS080.
- Install floatables controls at remaining outfalls.

CSO Implementation Plan and Schedule

Implementation Plan

The CSO Conceptual Plan proposes that some of the recommended CSO projects will be implemented by the Authority and others will be implemented by the CSO communities. The Authority's responsibilities will include facilities planning and MEPA review of all projects, as well as design and construction of those projects that will result in MWRA-owned facilities. The communities implementation responsibilities will include permitting, design, and construction of those projects that will result in community-owned facilities.

Under the plan, roughly $130 million of the total $420 million in projects will be implemented by the local communities. The CSO Conceptual Plan assumed that all capital costs for the planning, design and construction of the CSO projects, including the projects that will be implemented by the communities, would be funded under the Authority's CIP. Memoranda of Understanding (MOUs) and financial assistance agreements between the Authority and the CSO communities have been executed.

The implementation responsibilities discussed above reflect directly the longer term ownership, operation and maintenance requirements of the facilities, with the exception of projects in Chelsea, which will be implemented, but not owned, by the MWRA.

Community-owned and operated facilities will include:

- Improvements to existing local systems, including new sewers and storm drains that will be constructed to separate combined sewers.

- Manual bar screens or other floatables controls that will serve community-owned CSO outfalls.

MWRA-owned and operated facilities will include:

- New sewers and storage conduits that will upgrade the capacities of existing MWRA-owned sewers (Chelsea Branch Sewer and East Boston Branch Sewer) or that will constitute major extensions to existing MWRA and local sewer systems.
- Any upgraded or new CSO treatment facility.
- Manual bar screens or other floatables controls that will serve MWRA-owned CSO outfalls.

Schedule

The Final CSO Conceptual Plan/SMP Report included a "Proposed Implementation Schedule", which presented time frames for planning, design, and construction of the CSO projects recommended in the report. Adjustments to the schedule have been made through discussions with the communities, EPA and other parties relative to the development of MOUs and agreement on court schedule milestones. The schedule was finalized in June 1996, when the court adopted new CSO milestones for planning, design and construction. The court schedule includes design start dates and construction start and end dates for each of the recommended CSO projects. It also includes milestones for MWRA planning activities, regulatory agency review and DEP water quality standards determinations.

Water Quality Standards Determinations

The MWRA's CSO Plan is subject to review and approval for compliance with the state Water Quality Standards (WQS). While it is expected that most or all of the controls will be accepted as complying with the state's B_{cso} designation, approval of certain parts of the plan, most notably the Charles River controls, may require the issuance of waivers or the revision of water quality standards to provide a Partial Use Designation. Under the new court schedule for CSO control, DEP must issue its determinations by September, 1997, based on review of the Facilities Plan and EIR.

Coordination with Other Major Projects

Several of the CSO projects may be affected by major projects proposed by others (e.g. I-93 Reconstruction in Somerville, Central Artery). Coordination efforts are essential.

Watershed Planning

The Authority plays an active role in support of watershed planning activities, working closely with EOEA's Watershed Initiative Steering Committee, Technical Advisory Group subcommittee and Process Group subcommittee and with the technical committee overseeing the ongoing Charles River Watershed Association's (CRWA) watershed planning efforts. The Authority is also partially funding the Charles River Watershed Association's study, as approved on October 5, 1994 and May 1, 1996. The results of the state and CRWA planning efforts may affect the level of CSO control that is determined to be necessary and cost-effective in meeting water quality standards. The CSO Plan was developed in the context of overall pollution impacts from CSO and non-CSO sources. Watershed planning is necessary to develop a comprehensive plan for water quality improvement in the various receiving waters.

FY98 Program Status

Master Planning: The Secretary of Environmental Affairs' Certificate on the Final EIR is expected to be issued in July, 1997. Phase II services will be completed by September, 1997.

SOP Implementation: While the SOP projects were intended to be completed by December 1996, several of the projects can be implemented only after full pumping capacity is available at Deer Island. Therefore, several of the SOP projects may not be completed until FY98.

Design: Design services that began in FY96 and FY97 will continue into or through FY98. These include Upgrade of Existing CSO Facilities and Floatables Controls by MWRA, South Dorchester Bay, Neponset River and Constitution Beach Sewer Separation by BWSC, Alewife Brook Sewer Separation by Cambridge; and Floatables Controls by BWSC and Cambridge. New design starts in FY98 will include North Dorchester Bay/Reserved Channel Conduits and Pumping Facility by MWRA; Stony Brook Screening and Disinfection Facility and CAM005 Interceptor Connection Relief by MWRA; Chelsea Trunk Sewer and Chelsea Branch/Revere Extension Sewer Relief by MWRA; and BOS032 Interceptor Connection Relief by BWSC.

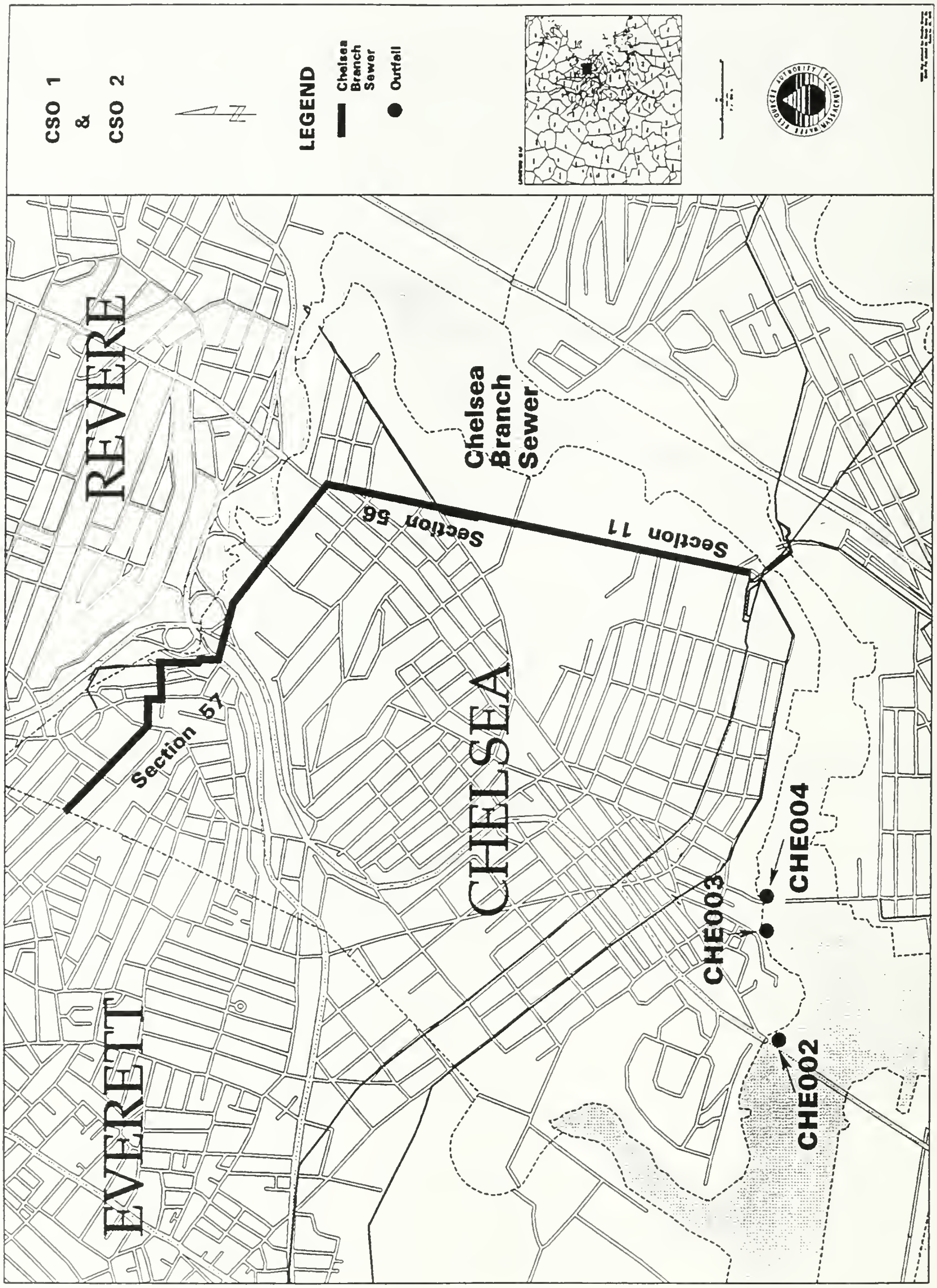
Watershed Planning: MWRA will continue to support EOEA and Charles River Watershed Association efforts in FY98.

Construction: Construction of Neponset River Sewer Separation by BWSC began in FY96 and will continue through FY98. No new construction start was scheduled in FY97. New construction starts in FY98 will include Fox Point, Commercial Point, and Cottage Farm Upgrades by MWRA.

CEB Impact A cost breakdown by component is not available because facilities planning is not yet complete. CEB impacts are not broken out by cost category because these costs are based on a lump sum projection from the Proposed FY98 CEB.

	FY99	FY00	FY01-07
Total	$20,500	$40,500	$2,648,000

Please note: The CEB impact of the projects implemented and owned by BWSC, Cambridge, Somerville, and Chelsea will be borne by those communities and are not included in the above operating cost projection.


CSO 1
&
CSO 2
LEGEND
Chelsea Branch Sewer
Outfall
REVERE
EVERETT
CHELSEA
Chelsea Branch Sewer
Section 56
Section 11
Section 57
CHE002
CHE003
CHE004

1501. Infiltration/Inflow Local Financial Assistance Program

Purpose

Infiltration/inflow (I/I), groundwater and stormwater which enters the collection system, contributes more than half of the total wastewater flow that the Authority treats. This depletes capacity that would otherwise be available to transmit sanitary flows. This situation results in sewer surcharging, overflows of untreated sewage, more frequent combined sewage overflows, and higher pumping and treatment costs. The I/I Program provides funding incentives for communities to rehabilitate their collection systems with the goal of structurally reducing I/I flows.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Grant	$15,937	May 93	Jun 05
Loan	$47,664	May 93	Jun 05
Repayment	($47,664)	May 94	Jun 10
TOTAL:	$15,937		

Project History and Background

MWRA's wastewater treatment plants receive flow from 43 communities. The collection system encompasses 230 miles of MWRA interceptors and 5,400 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and condition, but all contribute some quantity of infiltration and inflow (I/I).

On August 19, 1992, the MWRA Board of Directors approved $25 million to fund the I/I Local Financial Assistance Program. The program provides funding incentives for communities to rehabilitate their collection systems with the goal of structurally reducing I/I flows. The Authority allocated $25 million to the 43 sewer service area communities based on their share of the fiscal year 1993 sewer assessment. Each award consists of a 25 percent grant and a 75 percent interest free loan. Binding commitments for funds are issued by the Authority in the form of Financial Assistance Agreements. This initial program was conducted over two years.

The I/I Local Financial Assistance Program helps meet the Massachusetts Department of Environmental Protection (DEP) grant condition for the Wellesley Extension Sewer Replacement project that requires the MWRA to reduce inflow in the southern collection system by 53 million gallons per day. The grant condition requires the Authority to return the DEP grant funds ($41.4 million) if it does not achieve inflow removal. Through November 1995, communities in the southern system had completed rehabilitation projects which resulted in 74 million gallons per day of inflow removal. The inflow removal was documented in a letter to DEP, dated December 11, 1995. The Authority will continue to aggressively pursue I/I reduction through cooperative efforts with all 43 MWRA sewer communities.

Through May, 1996, the MWRA has distributed a total of $30.3 million in funds to 38 of the 43 communities under the I/I Local Financial Assistance Program.

On June 28, 1995, the MWRA approved $38.75 million to fund the second phase of the I/I Local Financial Assistance Program, which will be conducted over a ten year period. In addition, the $2 million which remained unused from the initial program was rolled over into the Phase II program. These funds will again be distributed to fund local I/I reduction projects as 25 percent grants and 75 percent interest-free loans.

Scope

Phase	Scope
Grant & Loan	Amount allocated to a community in proportion to community's share of rate revenue. Grant portion is 25 percent and loan portion is 75 percent of total award.
Repayment	Loans are repayable to the Authority in five equal annual payments beginning one year after the funds are distributed.

Changes in Scope since FY96-98 CIP

None.

CEB Impact

The CEB impact may be reductions in the marginal costs of transporting and treating flow at the Deer Island plant. The Authority will evaluate these costs after Start-up is complete.

WATERWORKS

PROPOSED WATERWORKS SYSTEM IMPROVEMENTS PROGRAM AND CAPITAL EXPENDITURE BUDGET FY 1998 - FY 2000

Introduction

The MWRA's Waterworks Division is responsible for operating and maintaining the water delivery system. The Waterworks system service area includes 47 communities with a total service population of approximately two million people.

The division operates and maintains 129 miles of aqueducts and tunnels, four hydroelectric power stations, 11 chemical feed stations, 265 miles of distribution pipelines, 12 distribution pump stations, 16 distribution reservoirs, and numerous buildings, dams, roads, and other facilities.

The Waterworks Division is responsible for identification of the system's capital needs including planning, design, and construction of all capital improvements.

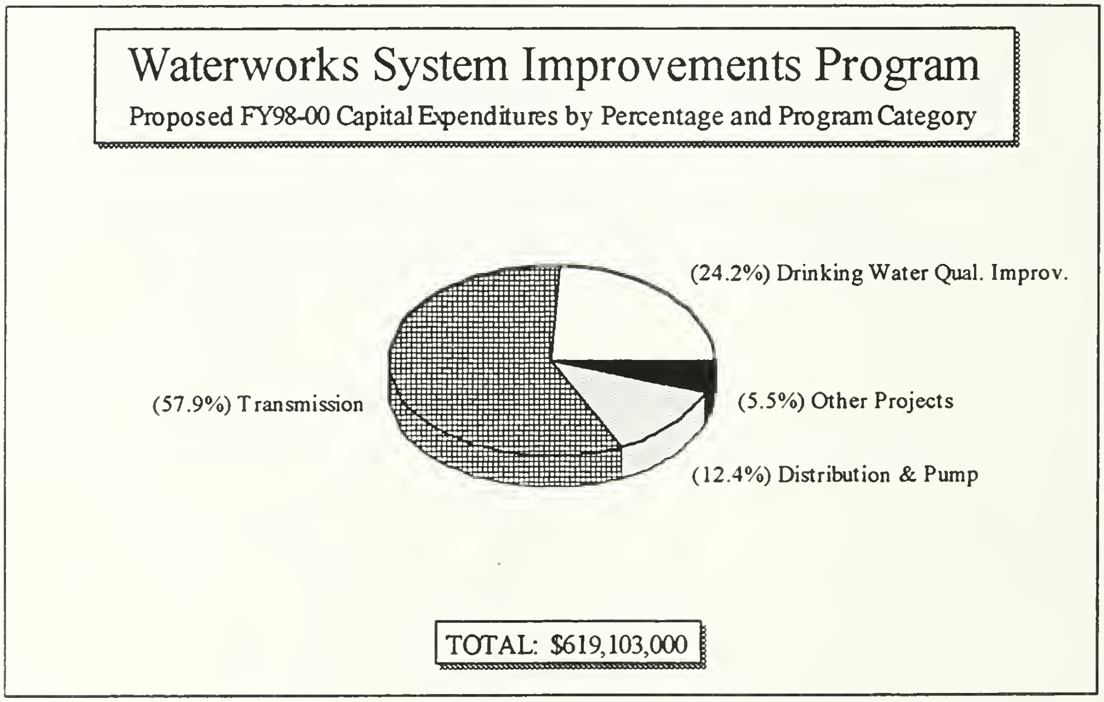
Capital Budget Summary

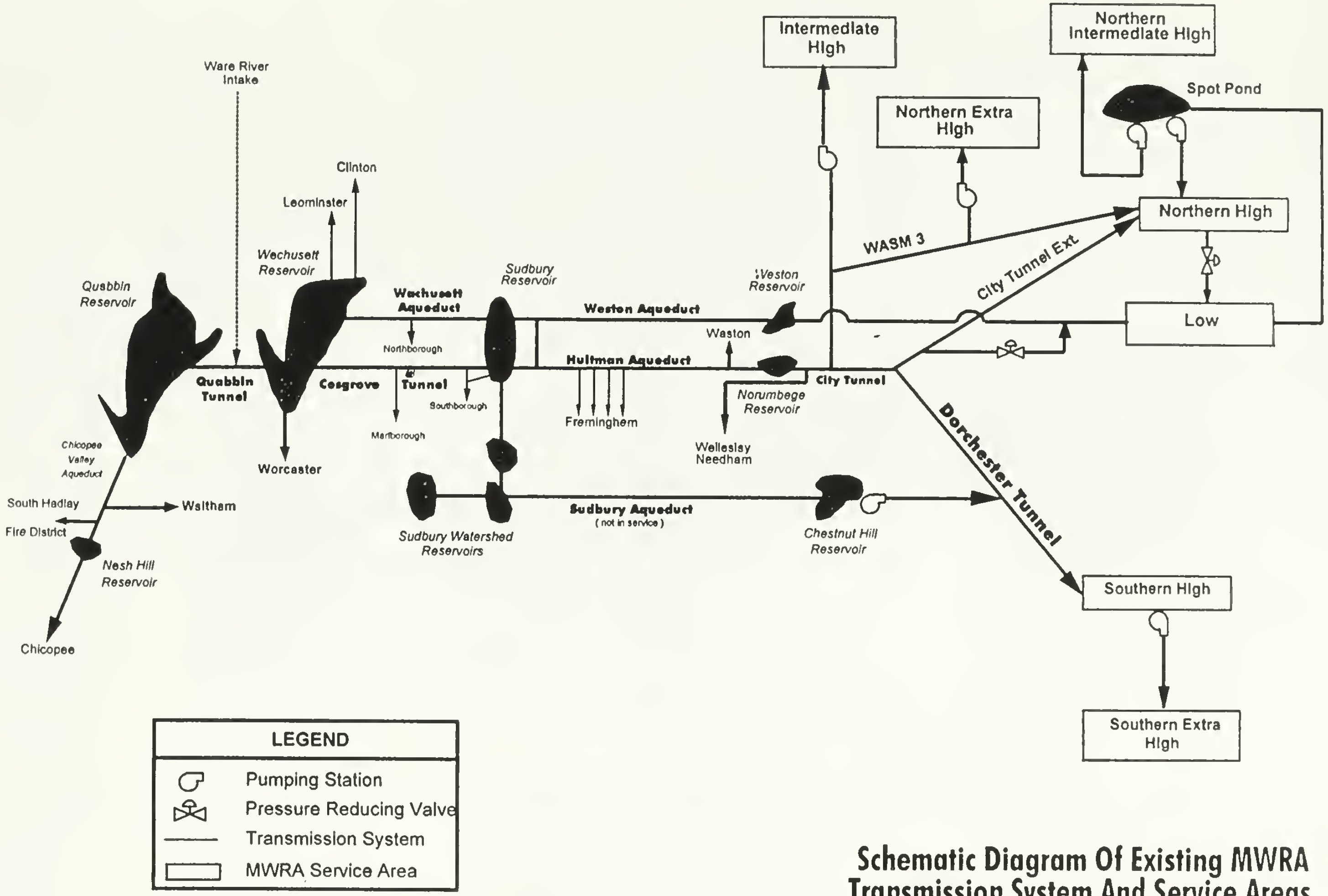
The proposed Waterworks system improvements program budget for the three year period FY98-00 is $619.1 million. The program is comprised of four program categories: drinking water quality improvements, transmission, distribution and pumping, and other capital projects. The table on the following page presents projected expenditures in each category. Retainage payments due for completed projects are also included in the totals.

An additional $852.8 million in expenditures beyond FY00 will be needed for project phases scheduled for completion after June 30, 2000.

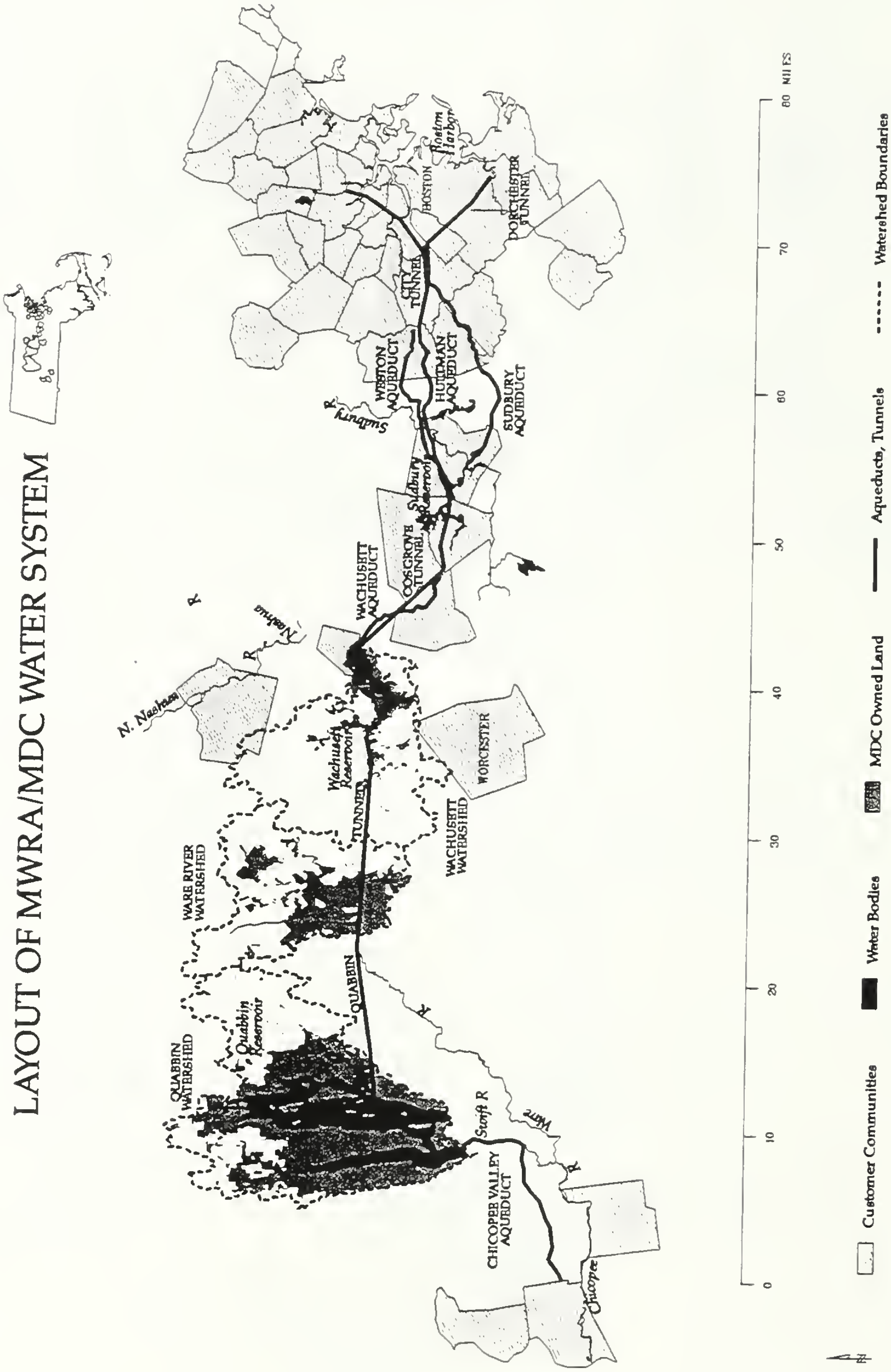
Waterworks System Improvements Program by Program Category
($000)

Program Category	FY98	FY99	FY00	FY98-00 Total	Beyond 2000
Drinking Water Quality Improvements	$23,947	$27,357	$98,475	$149,779	$414,859
Transmission	103,292	143,730	111,279	358,301	202,339
Distribution & Pumping	25,044	24,113	27,707	76,864	289,736
Other Projects	27,531	9,934	(3,306)	34,159	(14,807)
Total	**$179,814**	**$205,134**	**$234,155**	**$619,103**	**$892,127**





Schematic Diagram Of Existing MWRA Transmission System And Service Areas



LAYOUT OF MWRA/MDC WATER SYSTEM

DRINKING WATER QUALITY IMPROVEMENTS

WATER QUALITY IMPROVEMENT PROGRAM
GENERAL INFORMATION AND OVERVIEW

This section of the CIP describes eight projects for the improvement of water quality in the Waterworks system. Two involve construction of water treatment plants; five involve construction of covered storage; and one involves watershed protection.

The MWRA is committed to providing the highest quality drinking water to its customers and to ensure that the water it delivers meets the drinking water quality standards established by the federal Safe Drinking Water Act (SDWA). Meeting this commitment is requiring significant changes to the procedures and facilities used by the MWRA to provide quality water.

Applicable State and Federal Requirements

The Surface Water Treatment Rule (SWTR), promulgated by the U.S. Environmental Protection Agency (EPA) in 1989, specifies the conditions under which filtration of surface water supplies is required and mandates the use of more potent disinfection techniques. Since 1977, existing state regulations have dictated that once water has received final treatment, all downstream storage must be in enclosed facilities to preserve quality. The Lead and Copper Rule, promulgated in 1991, requires treatment actions to reduce the water's corrosivity if excessive levels of lead or copper are detected at consumers' taps. The EPA issued the Disinfectants and Disinfection By-Products Rule (D/DBP Rule) and the Enhanced Surface Water Treatment Rule (ESWTR) in draft form in July 1994. The D/DBP (Stage I) Rule is scheduled to be promulgated in January 1999. The D/DBP Rule will limit the concentration of certain chemicals of concern which form when water is disinfected.

The U.S. EPA, in the proposed ESWTR, is considering revisions to the Surface Water Treatment Rule which would require that surface water systems remove microbiological contaminants above levels currently required by the SWTR. In addition, the EPA is considering requiring surface water systems to treat for *Cryptosporidium*. ESWTR is scheduled to be promulgated several years later than D/DBP Rule (Stage 1). However an Interim ESWTR is scheduled to be promulgated at the same time as D/DBP Rule (Stage 1).

The Information Collection Rule (ICR), which was promulgated in 1996, requires surface water systems beginning in 1997 to collect additional data on occurrence, treatment, and characterization of disinfectants, disinfection by-products, and microorganisms. The EPA will use the data assembled from sources across the country to set enforceable limits for various disinfectant and disinfection by-products and microorganisms in the D/DBP Rule (Stage 1) and Interim ESWTR, and ultimately, in the D/DBP Rule (Stage II) and ESWTR. In anticipation of the Information Collection Rule, MWRA began collecting various water quality data in 1994.

From prior MWRA studies, it is known that the watersheds around the sources must be better protected, disinfection and corrosion control facilities must be modified and upgraded, and the use of open distribution reservoirs must be phased out. Construction of a filtration plant for Wachusett Reservoir water will be required unless source water quality can be sufficiently protected and other water quality parameters kept within regulatory limits.

The Massachusetts Department of Environmental Protection (DEP) is responsible for administering and enforcing drinking water quality standards in the Commonwealth.

The MWRA intends to continue working with the Massachusetts DEP and the U.S. EPA to develop a drinking water quality improvement program which satisfies the law, yet provides a cost effective and reliable approach to meeting this need.

Consent Order Terms

In 1990, DEP promulgated the state's version of the Surface Water Treatment Rule and issued guidelines on the application process for a filtration waiver. Below is a summary for each reservoir.

Quabbin Reservoir

Quabbin Reservoir is currently the source of water to the three Chicopee Valley Aqueduct communities. The Massachusetts DEP granted a conditional waiver from filtration for Quabbin Reservoir water. A Consent Order covering activities to support the continuation of the filtration waiver was signed in December 1991. The consent order schedule for design and construction of permanent disinfection facilities, which are needed to comply with the federal and state drinking water standards, was submitted to DEP in February 1994. The approved treatment process for disinfection is chlorination for primary disinfection, and chloramination for residual disinfection. The publication of new draft regulations for the Enhanced Surface Water Treatment Rule and Disinfectant/Disinfection By-Products Rule, and discussions regarding a possible *Cryptosporidium* rule have raised questions regarding the long term efficacy of this treatment technology.

Wachusett Reservoir

While the MWRA initially intended to seek a filtration waiver for Wachusett Reservoir, the effort was suspended in January 1991 after several months of testing indicated that total and fecal coliform levels in the reservoir exceeded the limit for avoiding filtration. Subsequently, in January 1992, the DEP issued a determination that filtration would be required for Wachusett Reservoir. During negotiation of the DEP Consent Order to enforce the SWTR, the MWRA was successful in securing terms which would provide additional flexibility relative to the Wachusett Reservoir filtration requirement. On June 11, 1993, the MWRA, MDC, and DEP signed a Consent Order which outlines the obligations for compliance with the SWTR under a dual track approach.

The filtration track requires the MWRA to continue preparations for constructing a filtration facility by December 2001. Preliminary and final designs for filtration and disinfection facilities must be completed by 1998. The non-filtration track allows the MWRA and the MDC to take actions which may enable the Wachusett Reservoir to meet the criteria for a filtration waiver prior to the start of construction of a water treatment facility, reducing its cost significantly. A decision on which type of treatment facility will be built is expected to be made in late-1998.

The non-filtration track stipulated that a Watershed Protection Plan be formally submitted to DEP by September 1, 1993 and that it be implemented by July 31, 1998. Furthermore, source water quality improvement must be achieved, as demonstrated by meeting the coliform standard for 12 consecutive 6-month periods.

The Consent Order also established schedules for coming into compliance with requirements for covered storage: Construction of covered storage to be completed by December 31, 1998, at Fells Reservoir, and Norumbega Reservoir to be in compliance by December 31, 2000. The use of Spot Pond and Weston Reservoir must be discontinued by November 30, 1997, and July 31, 2001, respectively. *It should be noted that the project schedules for the water treatment plant and the Norumbega covered storage facility included in this CIP differ from the current Consent Order schedules. MWRA is currently negotiating schedule changes with DEP for the water treatment plant and Norumbega Reservoir. These revised schedules will require DEP approval.*

Watershed Protection Needs

Under the Reservoir Risk Assessment project which was completed in 1992, the MWRA and the MDC jointly produced watershed protection plans for each of the sources. Consistent with DEP guidelines, the plans described the physical characteristics of the watersheds, evaluated existing and potential pollution threats, and recommended measures to control those threats.

In the Wachusett Reservoir watershed, the most serious threats were judged to be failing and substandard septic systems, poor quality storm water runoff, and gull populations near the intake. Other factors of concern included the high development density near the reservoir, the low percentage of land ownership by the MDC, and the risk of a transportation accident which could cause chemical contamination of the reservoir. To address these problems the MDC will need to carry out an aggressive protection program over the next two years including such measures as acquisition of additional land parcels near tributaries, implementation and enforcement of the Cohen bill land used restrictions, design and construction of sewers to replace septic systems in critical areas, provision of technical assistance to local communities and boards of health, and stepped-up efforts to prevent gulls from congregating near the intake. As part of this project's environmental review phase, a re-evaluation of the watershed protection plan was conducted to determine if some changes or accelerated measures could help improve the likelihood of meeting the filtration avoidance criteria.

The cooperation and support of local, state, and federal agencies is essential to the success of many watershed protection initiatives. The MDC and the MWRA will seek to ensure that other agencies and entities appropriately carry out their duties and responsibilities to preserve environmental quality and water resources within the watersheds. Positive actions in this regard include the inclusion of the Wachusett watershed in a five-year program sponsored by the United States Department of Agriculture to reduce non-point source pollution, a joint DEP-MDC study on the impacts of storm water on a major tributary, a successful bird harassment program, an aggressive land acquisition effort, stronger regulations on septic systems promulgated by DEP, and the formation of the “Wachusett Task Force” to facilitate inter-town communication and coordination on common issues facing health and planning boards. The jointly funded sewering project for portions of Holden and West Boylston discussed in the Watershed Protection project (#2104) is an excellent example of this effort. Other opportunities to increase participation and funding by outside agencies will be pursued.

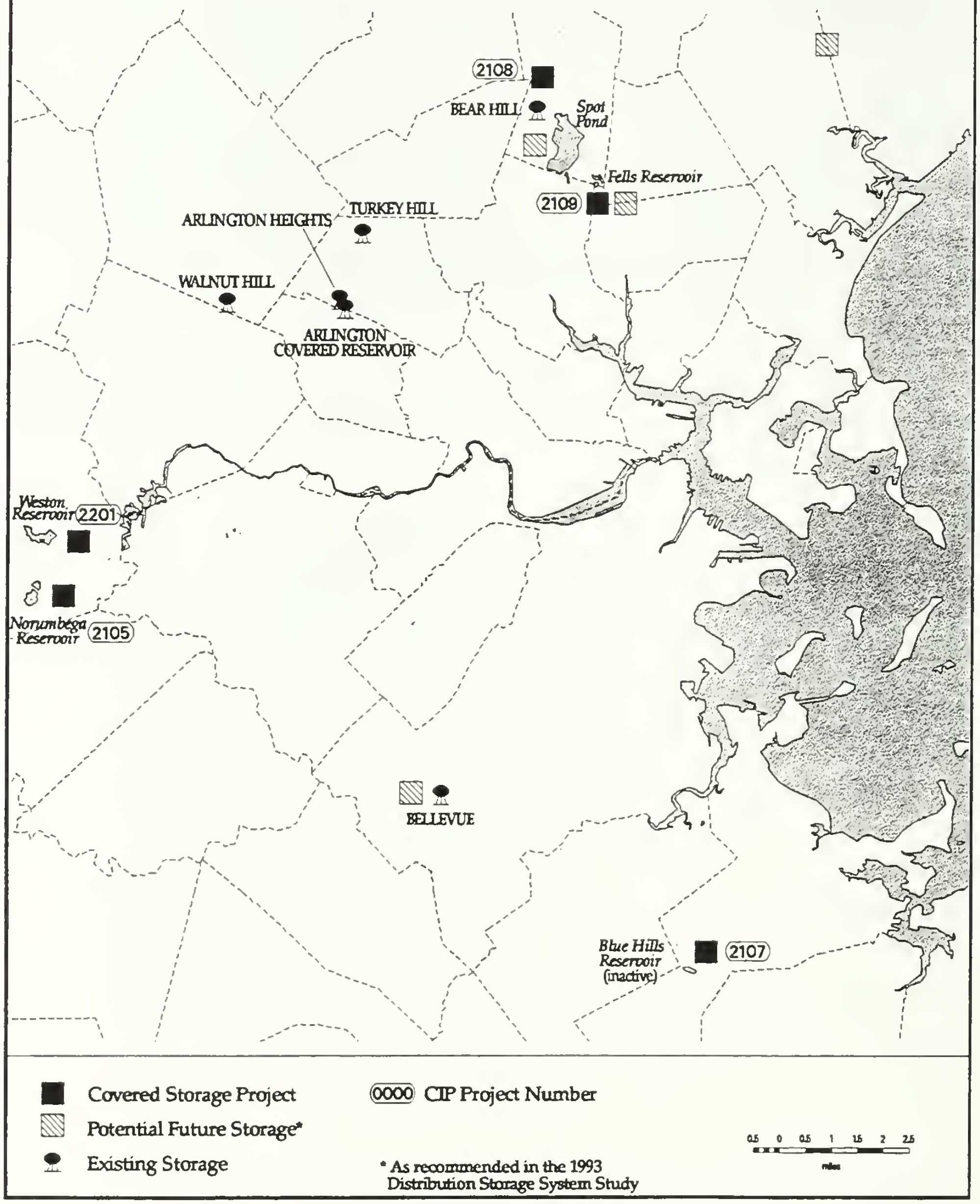
Covered Storage

Open reservoirs within the water distribution system are considered primary water supply sources under the Safe Drinking Water Act and are therefore subject to the Surface Water Treatment Rule. State regulations require that all open distribution reservoirs be covered to prevent airborne, land, and waterborne contamination. The

MWRA's long-term plan is to eventually provide approximately 460 million gallons of enclosed storage at various locations throughout the system. This quantity represents approximately one day of maximum demand.

This CIP includes only those storage facilities scheduled to start construction by 2006 and which will provide a total of 260 million gallons of storage. The existing Norumbega Reservoir is expected to be maintained to provide an additional minimum of 75 million gallons of open storage for emergency back-up. Covered storage is proposed in the following projects (see map on the following page): a 50 million gallon clear well at the Walnut Hill water treatment plant (project #2101), 115 million gallons at Norumbega Reservoir (project #2105), 25 million gallons at the Nash Hill Reservoir (project #2106), 30 million gallons at Blue Hills (project #2107), 20 million gallons at the Fells Reservoir (project #2109), and 20 million gallons at the Weston Reservoir (project #2201, MetroWest Water Supply Tunnel).

COVERED DISTRIBUTION STORAGE PROJECTS



2101. Walnut Hill Water Treatment Plant

Purpose

To provide high quality drinking water to MWRA customers and to ensure that the water delivered from the Wachusett Reservoir meets the drinking water quality standards established by the Federal Safe Drinking Water Act (SDWA). Part of this objective will be met by constructing a 450 million gallon per day (maximum) capacity water treatment plant.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Studies	$4,109	Jan 88	Jan 00
Permit Fees	$36	Jul 93	Jun 98
EIR/Conceptual Design	$5,975	Nov 93	Sep 96
Design/ESDC	$23,460	Oct 96	May 05
Design Management Support	$2,853	Jan 97	Jan 99
Water Quality Decision Support	$500	Jul 97	Dec 98
Construction	$339,326	Nov 99	May 05
Construction Management/RI	$30,273	Mar 98	May 05
Technical Assistance	$18	Jan 88	May 05
TOTAL:	$406,550		

Project History and Background

Pilot and Demonstration Treatment Studies

An initial Pilot Treatment Program study was completed in 1993 to evaluate alternative filtration, disinfection, and corrosion control processes and determine which were most appropriate for MWRA source waters. A small scale demonstration water treatment plant was constructed to optimize and confirm the recommended, and DEP-approved treatment processes based on pilot plant results, to acquire more information on backwash and solids disposal issues, and to produce design data necessary for the future design of the full scale plant. The demonstration plant began operations in 1994 and completed operations in September 1995. The demonstration plant results proved that it is possible to produce comparable water quality at a higher treatment rate than the DEP approved rate. The higher treatment rate will reduce the overall capital cost of the water treatment plant. A request to revise the DEP approved rate has been approved. The demonstration plant results were incorporated into an updated study that identified potential locations for constructing treatment facilities. This study will be further revised when additional information on federal and state standards becomes available, and will include a more detailed assessment of the forthcoming Disinfection By-Products Rule.

Environmental Review and Conceptual Design

The EIR and Conceptual Design for the treatment plant included environmental reviews, data collection and analyses, and facility designs which support the dual track compliance approach. To promote the less expensivee non-filtration track, more information was developed on how the Wachusett Reservoir and watershed function as a system, the causes of the reservoir's historic inability to meet the filtration avoidance criteria, and what actions could be taken to rapidly improve water quality. For both the filtration and non-filtration alternatives, detailed siting and environmental studies were conducted and conceptual designs prepared. The Conceptual Design Reports contain life cycle cost analyses, process design criteria, site plans, plant hydraulics, and additional design specifications.

Walnut Hill Water Treatment Plant

The Walnut Hill Water Treatment Plant (WTP) is being designed as three alternative plants: 1) Chlorine/Chloramination, 2) Ozone/Chloramination, and 3) DAF/Ozone/Filtration/ Chloramination. All three alternatives include raw water pumping, a 50-million gallon clearwell for finished water storage, corrosion control facilities, and raw and finished water connections. The three alternatives are being designed in a modular fashion so that construction of facility alternatives can proceed additively from one alternative to another if necessary. All three alternatives will be designed to the 90 percent level and a decision on which to build will be made in late-1998.

Design Management and Water Quality Decision Support

The Walnut Hill WTP is a major and complicated project proceeding under a DEP Consent Order schedule. Management support services during the design and construction phases are needed to assist MWRA staff. Professional services for design, value engineering review, and filtration decision support will be procured from engineering firms having resources and expertise for these tasks.

Construction Management and Resident Inspection

The construction phase of the Walnut Hill WTP will be managed with a model similar to that used on the Boston Harbor Project and the MetroWest Water Supply Tunnel. Under this approach, MWRA will hire a Construction Management firm (CM), who will provide a full range of construction management services. The CM will be responsible for the day-to-day construction management services, including: resident engineering, inspection, quality assurance, environmental and mitigation compliance, cost and schedule management, safety, document control, contract management, change order control, labor management, training, testing, start-up, and warranty issues. The CM will coordinate the resolution of technical construction issues with the Design Engineer who will provide technical support. The Waterworks Capital Engineering and Construction Department will oversee the construction program and provide direction to both the CM and the Design Engineer, who will provide Engineering Services During Construction.

Open Reservoir Water Quality Study

In June 1993, the MWRA entered into a consent order with the Massachusetts DEP to provide covered distribution storage reservoirs and place existing open reservoirs off-line and use for emergency storage for Norumbega, Weston, Spot Pond, and Fells reservoirs. Water quality in these open reservoirs should be maintained to avoid unreasonable degradation. An $867,000 study is proposed as part of the Walnut Hill WTP project to evaluate ways to maintain the water quality in these open reservoirs.

AWWARF Red Water Control Strategy Study

Many member communities served by the MWRA have been experiencing discolored water in their distribution system, some with severe problems. The discolored water, which is typically characterized as yellow, red, or turbid, is due to the release of iron from older unlined cast-iron pipe. This study will evaluate various treatment options for eliminating discolored water. The study will investigate the fundamental aspects of iron chemistry and corrosion using unlined cast-iron pipe from MWRA community distribution system.

The total study cost is estimated to be $400,000 without American Water Works Research Foundation (AWWARF) funds. By consolidating efforts with

AWWARF the cost is reduced to $200,000. Funding for this study has been reallocated from the Walnut Hill WTP Design phase. The project will begin in late 1996 and be completed in January 1999.

Cryptosporidium Inactivation Study

The adverse public health impacts of *Cryptosporidium* have focused public and regulatory attention on the control of this pathogenic organism by public water suppliers. In order to assuage public concerns and to comply with future regulations, public water suppliers must design and operate disinfection systems that ensure *Cryptosporidium* inactivation. There are no applied inactivation levels for *Cryptosporidium* in natural source waters using demonstrated effective disinfection strategies. The objective of this study is to develop design criteria for full-scale disinfection systems based on *Cryptosporidium* inactivation levels determined from bench-scale disinfection experiments. MWRA could potentially achieve substantial savings in construction and O&M costs of the proposed Walnut Hill Water Treatment Plant disinfection facilities through the application of the design criteria developed in this study. The AWWARF is providing partial funding for preparation of the final study report.

Scope

Phase	Scope
Study 1	Investigate the potential impacts of SDWA amendments on the MWRA system and evaluate the need, feasibility, and benefits of improved treatment processes.
Study 2	Evaluate alternative filtration, disinfection, and corrosion control processes to determine which were most appropriate for MWRA source waters. A pilot plant was constructed and operated at the Wachusett Reservoir to allow testing of various treatment technique combinations. Identify potential locations for constructing treatment facilities.
Open Reservoir Water Quality Study	Investigate potential impacts on the open distribution reservoirs, due to the displacement of their usage by new covered distribution reservoirs, and study ways to maintain their water quality for emergency supply. Norumbega, Weston, Spot Pond, and Fells Reservoirs will be studied.
AWWARF Red Water Control Strategy Study	Evaluate various treatment options for eliminating discolored water due to unlined cast-iron pipe. Also investigate the fundamental aspects of iron chemistry and corrosion using unlined cast-iron pipe from MWRA community distribution system.

Crypto Inactivation Study	Determine the site specific efficacy of inactivating *Cryptosporidium* in Wachusett Reservoir source water using recommended disinfectant alternatives chlorine/chloramine and ozone/chloramine, and then develop design criteria for the full-scale disinfection contacting system.
Permit Fees	Permitting fees related to the various phases of this project.
Technical Assistance	Technical assistance for the water treatment plant.
EIR/Conceptual Design	Environmental reviews, data collection and analyses, facility designs which will support the dual track compliance approach, evaluation of design criteria, site plans, plant hydraulics, and construction of a small scale demonstration water treatment plant were completed.
Design/ESDC	Design and Engineering Services During Construction for a 450 mgd water treatment plant and other associated components.
Construction	Construction of a 450 mgd water treatment plant, chemical feed equipment, a 50 million gallon clear well for storage, an administration building, a raw water pump station, and new raw water and finished water connections .
Design Management Support	Professional service and value engineering support to MWRA staff in the design of the water treatment plant.
Construction Management/RI	Construction management support on-site during construction of the proposed water treatment plant.
Water Quality Decision Support	Professional service and water quality expertise support to MWRA staff in determining the method of treatment to pursue.

Changes in Scope Since FY97-99 CIP

Phase	**Change**
Open Reservoir Water Quality Study	New phase.
AWWARF Red Water Control Strategy Study	New phase.
Distribution Water Quality Study	Deleted this phase.

Permit Fees	Renamed phase from DEP Fees to Permit Fees.
Design/ESDC	Removed work associated with resident inspection and changed phase name from Design/CA/RI to Design/ESDC.
Construction Management/RI	Expanded the scope for construction management support to include full construction management and resident inspection.
Water Quality Decision Support	New phase.
Norumbega Covered Storage: Preliminary Design, Design/CA/RI, Construction, Land, Appraisal	Now a seperate project under the Drinking Water Quality Improvements program category.
Interim Corrosion Control: Design/CA/RI, Construction Wachusett, Construction Northboro	Substantially complete.

CEB Impact The estimated annual costs of operating a water treatment plant and corrosion and disinfection facilities range from $5 million to $10 million. An estimate of the operations and maintenance costs for the new plant will be developed in the design phase. Following are incremental costs for only the Interim Corrosion Control Facility:

CEB line item	**Incremental cost in FY 98**	**Description**
Labor		
Chemical		
Gas		
Electricity		
Supplies		
Maintenance	$20,000	
Total	$20,000	

2102. Quabbin Water Treatment Plant

Purpose

To improve the quality of drinking water delivered to the three Chicopee Valley Aqueduct communities of Chicopee, Wilbraham, and South Hadley Fire District No. 1, and to ensure that the water delivered meets the drinking water quality standards established by the Federal Safe Drinking Water Act. Improvements will include construction of a corrosion control facility and disinfection facilities and covered storage at Nash Hill Reservoir (project #2106).

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$2,260	May 95	Jul 00
Construction	$2,272	Aug 98	Jul 00
Land	$52	Jun 97	Jul 98
DEP Permit Fees	$5	Jul 96	Aug 98
TOTAL:	$4,589		

Project History and Background

Currently, the MWRA provides water to the three Chicopee Valley Aqueduct (CVA) communities under long-term contracts with specific termination dates of 1998 (South Hadley) and 2000 (Chicopee and Wilbraham). The rates paid to the MWRA under these contracts are less than ten percent of the current prevailing rate, and cannot be changed prior to the termination dates in the contracts. At that time, the MWRA and the communities will negotiate new water supply agreements under the MWRA's Regulations for the Continuation of Contract Water Supply. The regulations currently require a ten-year term and payment of the prevailing rate.

In December 1991, the Board of Directors authorized staff to develop, for Board approval, Memoranda of Understanding (MOU) with Chicopee, South Hadley Fire District No. 1, and Wilbraham for the interim period until their contracts are renewed, stating that the MWRA will assume responsibility for meeting federal and state drinking water standards for water supplied through the CVA. In the interim, the Winsor chlorination station has been rebuilt to serve as a temporary disinfection facility. Chicopee has signed, and the Board has approved an MOU. South Hadley Fire District No. 1 has signed an MOU. Negotiations continue with Wilbraham. No final design or related work for South Hadley and Wilbraham will be undertaken until the MOUs have been approved by the MWRA Board of Directors.

Quabbin Reservoir is currently the source of water to the three Chicopee Valley Aqueduct communities. The Massachusetts DEP granted a conditional waiver from filtration for Quabbin Reservoir water. A Consent Order covering activities to support the continuation of the filtration waiver was signed in December 1991. The consent order schedule for design and construction of permanent disinfection and corrosion control facilities, which are needed to comply with the federal and state drinking water standards, was submitted to DEP in February 1994. The approved treatment processes for disinfection and corrosion control are chlorination for primary disinfection, chloramination for residual disinfection, and lime/carbon dioxide for corrosion control. The publication of new draft regulations for the Enhanced Surface Water Treatment Rule and Disinfectant/Disinfection By-Products Rule, and discussions regarding a possible *Cryptosporidium* rule have raised questions regarding the long term efficacy of this treatment technology.

An action plan was developed to account for the possibility of future treatment requirements. A life cycle cost analysis found that the chlorine/chloramine option is the most cost effective, even if additional treatment is required as soon as two years later. The current project construction budget is based on chlorination and chloramination. Ozonation facilities or other treatment processes may be ultimately required.

Because the City of Chicopee recently constructed and placed into operation its own corrosion control facility, it may not be desirable or practical for the MWRA to build a central corrosion control facility to serve all three communities. It may prove to be more cost-effective for MWRA and the communities to construct two smaller facilities, one each for Wilbraham, assuming they sign an MOU, and South Hadley Fire Department No. 1, or for the communities to construct their own corrosion control facilities. A feasibility study and LCCA will be conducted to identify the most cost-effective alternative. It is anticipated that baking soda/soda ash would be utilized for the small corrosion control facilities if constructed by the MWRA.

However, the construction budget does not include funds for the two satellite corrosion control facilities and will not until both Wilbraham and South Hadley have signed and Board approved MOUs with the MWRA.

Construction of the interim disinfection facility at Winsor Dam has been funded by the MWRA, at no additional charge to the three CVA communities. Under the terms of the MOUs, the three CVA communities will reimburse the MWRA for any debt service and operating costs relating to study, design, and construction of additional treatment facilities for Quabbin Reservoir and covered storage at Nash Hill Reservoir (project #2106).

Scope

Phase	**Scope**
Quabbin WTP: Design/CA/RI	Includes a system hydraulics study, Preliminary Design, Design, Construction Administration, and Resident Inspection for a corrosion control facility and disinfection facilities (The design budget was originally scoped for an ozone facility. Negotiations are underway to reduce the contract amount to reflect the current scope for a disinfection facility.)
Land	Requisition of two plus acres of land for siting disinfection facilities.
Quabbin WTP: Construction	Construction of disinfection facilities.
DEP Permit Fee	Department of Environmental Protection permit fees for required construction.

Changes in Scope Since FY97-99 CIP

Phase	**Change**
Nash Hill Covered Storage: Preliminary Design, Design/CA/RI, and Construction	Now a seperate project under the Drinking Water Quality Improvements program category.

CEB Impact

CEB Line item	Incremental Cost in FY00	Description
Chemicals	$3,000	
Utilities	$10,000	Quabbin Water Treatment Plant utilities
Total	$13,000	

2104. Watershed Protection

Purpose

To develop watershed protection plans and implement protection measures for the MWRA/MDC reservoir system.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Holden/W. Boylston Sewer	$8,500	Jul 96	Jun 00
Study	$101	Apr 95	Apr 97
TOTAL:	$8,601		

Project History and Background

Sudbury Reservoir Watershed Protection Plan

MWRA has already completed watershed protection plans for the Wachusett and Quabbin/Ware watersheds. Implementation of these plans by the MDC and MWRA is ongoing and is a major component of the MWRA's dual-track approach for Wachusett water treatment planning. This project consists of two additional components: a Sudbury Reservoir Watershed Protection Plan, and the MWRA's contribution to the MDC's Wastewater Facilities Plan for the Wachusett Reservoir watershed. There currently is no water quality management or protection plan for the Sudbury Reservoir system, which is MWRA's only back-up supply, and threats to water quality have proliferated in the past two decades. The protection plan to be completed by April 1997, will provide guidance to the MDC on future policy and management decisions regarding water quality protection of the Sudbury Reservoir system. The wastewater facilities plan consists of providing sewer service to critical portions of the towns of Holden and West Boylston to protect Wachusett Reservoir water quality.

The Sudbury Reservoir system, which includes the main reservoir and Framingham #3, is the only back-up water service in the MWRA system. The reservoirs are located in Southborough, Marlborough, and Framingham, and their watersheds incorporate portions of Westborough, Northborough, and Ashland.

Although the Sudbury Reservoir has been on reserve status since 1974, it remains an essential emergency response component for the waterworks system.

The Sudbury Reservoir could function either as a direct source of supply to the metropolitan area for up to one month (in case of an interruption in flow from Wachusett Reservoir) or as a transmission channel to convey a mixture of Wachusett-Sudbury water through to the Sudbury Aqueduct or Weston Aqueduct (in case of a failure along the Hultman Aqueduct).

The Sudbury Reservoir has a long history of water quality problems, and any contemporary use of the reservoir for drinking water may trigger issuance of a public health advisory and/or boil order. Furthermore, since its deactivation in 1974, there has been little attention to watershed protection around the reservoir. As a result, the watershed has become more developed during the past two decades and sources of pollution of the reservoir have increased. These factors have raised concerns about the long-term viability and usefulness of the Sudbury Reservoir as a drinking water resource.

West Boylston/Holden Sewer

The Metropolitan District Commission (MDC) is implementing a $58 million wastewater facilities plan for portions of Holden and West Boylston in the Wachusett Reservoir watershed. A wastewater collection system will replace failing or marginal septic systems in the area and has been identified as a top watershed protection priority by MWRA, MDC, DEP, and EPA. A total of 72 miles of sewer pipe is planned, with sewage conveyed to and treated at the Upper Blackstone Water Pollution Control Facility.

A cost sharing formula was approved between the Commonwealth of Massachusetts, the towns of Holden and West Boylston, and the MWRA in the fall of 1995, after six months of negotiations.

Scope

Phase	Scope
Reservoir Protection Study	Document current conditions in the watershed and develop a reasonable strategy for maintaining acceptable water quality in the Sudbury Reservoir.
West Boylston / Holden Sewer	MWRA's share of the cost of implementing the MDC's wastewater facilities plan in the Wachusett Reservoir Watershed.

Changes in Scope Since FY97-99 CIP	None.

CEB Impact	None.

2105. Norumbega Covered Storage

Purpose

To provide high quality drinking water to MWRA customers and to ensure that the water delivered meets the drinking water quality standards established by the Federal Safe Drinking Water Act (SDWA). Part of this objective will be met by constructing a 115 million gallon covered storage facility at Norumbega Reservoir.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Design	$1,728	Sep 92	Mar 97
Design/CA/RI	$7,577	Dec 97	Aug 04
Construction	$96,183	Jul 00	Aug 04
Appraisal	$25	Nov 95	Jul 98
Land	$160	Sep 98	Jan 00
TOTAL:	$105,673		

Project History and Background

The Norumbega Reservoir is an uncovered distribution storage reservoir connected to the Hultman Aqueduct in Weston. It provides active distribution storage and hydraulic control for approximately 85 percent of the water supplied to the metropolitan Boston Area. The reservoir has a total capacity of 205 million gallons and a surface area of approximately 40 acres.

DEP and MWRA entered into a Consent Order on June 11, 1993 requiring that Norumbega Reservoir comply with state and federal regulations by the end of the year 2000. MWRA recently submitted a request to DEP for a modification of the Consent Order, which would extend this compliance deadline to February of 2004 (completion of all facilities at Norumbega Reservoir). To meet the terms of the consent order, MWRA plans to construct distribution storage, connect to planned transmission improvement, and provide associated facilities in the vicinity of Norumbega Reservoir. The project site is located immediately south of the Massachusetts Turnpike (Mass Pike) in Weston, bounded on the east, south, and west by Oak Street, Glen Road, and Wellesley Street, respectively.

The primary component of the project is a reinforced concrete storage tank, with 115 million gallons of usable storage. The tank is proposed to be constructed west of Schenk's Pond, between Norumbega Reservoir and the Mass Pike, on land currently owned by the Town of Weston and the Weston Forest and Trail Association (WFTA). This land will be acquired from the two parties by MWRA. The tank will cover approximately 19 acres. The tank will contain water which has been fully treated at the proposed Walnut Hill Water Treatment Plant.

Disinfection facilities will be maintained on-site for emergency use in the event that it becomes necessary to draw water directly from the open Norumbega Reservoir and/or Schenck's Pond. Chlorine will be applied at the Norumbega gate house.

Scope

Phase	Scope
Norumbega: Preliminary Design/EIR	Environmental reviews, data collection and analyses, and preliminary designs for covered storage at Norumbega Reservoir.
Norumbega: Des/CA/RI	Design, Construction Administration, and Resident Inspection of a 115 million gallon covered storage facility at the Norumbega Reservoir.
Norumbega: Construction	Construction of a 115 million gallon covered storage facility at the Norumbega Reservoir.
Land	Land acquisition for Norumbega Covered Storage. *This is the subject of on-going negotiation with the Town of Weston.*
Appraisal	Appraisal of land for Norumbega Covered Storage.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

The estimated annual cost of maintaining the quality and quantity of the open Norumbega Reservoir for emergency use after it is taken off-line is approximately $82,000 per year. An estimate of the operations and maintenance costs for the new covered storage facility will be developed in the design phase.

2106. Nash Hill Covered Storage

Purpose

To improve the quality of drinking water delivered to the three Chicopee Valley Aqueduct communities of Chicopee, Wilbraham, and South Hadley Fire District No. 1, and to ensure that the water delivered meets the drinking water quality standards established by the Federal Safe Drinking Water Act. Part of this objective will be met by constructing covered storage at Nash Hill Reservoir.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Design	$368	Jan 93	Dec 94
Design/CA/RI	$1,156	Aug 95	Oct 99
Construction	$12,852	Nov 97	Oct 99
TOTAL:	$14,376		

Project History and Background

Open reservoirs within the water distribution system are considered primary water supply sources under the Safe Drinking Water Act and are therefore subject to the Surface Water Treatment Rule. State regulations require that all open distribution reservoirs be covered to prevent airborne, land, and water-borne contamination. In order to comply with the December 1991 consent order between the MWRA and the Massachusetts Department of Environmental Protection (DEP), the MWRA must provide covered distribution storage at the Nash Hill Reservoir.

Nash Hill Reservoir is a single, undivided, uncovered, man-made basin that is connected to the Chicopee Valley Aqueduct in the Town of Ludlow. The reservoir was constructed in 1950, and provides distribution storage and hydraulic control for water supplied from Quabbin Reservoir to Chicopee, Wilbraham, and South Hadley Fire District No. 1. Nash Hill Reservoir has a total capacity of approximately 25 million gallons, a surface area of approximately five acres, and a maximum depth of approximately 20 feet. This open reservoir is proposed to be replaced by two 12.5 million gallon covered tanks.

Scope

Phase	Scope
Preliminary Design	Study to determine the most suitable type of covered storage, and preliminary design of preferred alternative.
Design/CA/RI	Design, construction administration, and resident inspection of two covered storage facilities.
Construction	Construction of two pre-stressed, precast 12.5 million gallon flat roof storage facilities at the reservoir.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction	Added yard piping for operational flexibility and to increase system reliability, increased site work and earthwork to provide a larger staging area for tank construction and pipeline installation, and expanded electrical and instrumentation to automate the control system.

CEB Impact

The estimated annual cost of operating the corrosion control and disinfection facility is $470,000. An estimate of the operations and maintenance cost for the new facility will be developed during the design phase.

2107. Blue Hills Covered Storage

Purpose

To provide sufficient distribution storage for the Southern High service area. Presently, the distribution system has no active or emergency storage for Quincy and communities south, creating the potential for supply disruption if repairs are needed on a major transmission line. The new covered storage facility at the Blue Hills Reservation will have a storage capacity of 30 million gallons.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Design/EIR	$566	Jul 97	Sep 99
Final Design/CA/RI	$2,872	May 00	Mar 05
Construction	$22,968	Mar 03	Mar 05
DEP/Permit Fees	$4	Mar 02	Feb 03
TOTAL:	$26,410		

Project History and Background

Blue Hills Reservoir is a currently inactive open distribution reservoir. Based on a recently-completed engineering study, the MWRA's long-term plan is to provide 460 million gallons of enclosed storage at various locations throughout the waterworks system. This quantity represents approximately one day of maximum demand. The study identified the need for a 30-million gallon covered storage facility at this location. The storage facility will work in conjunction with Section 22 to supply water for the Southern High System in the event that the Dorchester Tunnel requires repairs and will supply water to Quincy in the event that the northern portion of Section 22 is shut down due to a break or for repairs.

Open reservoirs within the water distribution system are considered primary water supply sources under the Safe Drinking Water Act and are therefore subject to the Surface Water Treatment Rule.

State regulations require that all open distribution reservoirs be covered to prevent airborne, land, and water-borne contamination.

Scope

Phase	Scope
Preliminary Design/EIR	Preliminary design of a 30-million gallon covered storage facility.
Final Design	Final design of the facility.
Construction	Construction of the facility.
DEP/Permit Fees	Department of Environmental Protection permit fees for required construction

Changes in Scope Since FY97-99 CIP

Phase	Change
DEP/Permit Fees	New phase.

CEB Impact None.

2108. Bear Hill Covered Storage

Purpose

To provide an additional storage facility for the Northern Intermediate High System for adequate water pressures and to allow necessary maintenance for preservation of water quality in the existing Bear Hill tank. Construction of a new six-million gallon covered storage facility near the existing tank will double the available storage for the Northern Intermediate High System.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Design/EIR	$516	Jan 04	Dec 05
Final Design/CA/RI	$516	Jan 06	Dec 11
Construction	$4,129	Jan 09	Dec 11
TOTAL:	$5,161		

Project History and Background

Presently, the MWRA pumps water from the Spot Pond Pump Station to the Bear Hill Tank in Stoneham which serves the Northern Intermediate High Service communities of Stoneham, Wakefield, and Woburn.

The existing Bear Hill covered storage facility has a capacity of six million gallons and does not provide sufficient emergency storage for the service area. The MWRA cannot deactivate the tank for necessary cleaning and maintenance without disrupting service.

Scope

Phase	Scope
Preliminary Design/EIR	Prepare an environmental impact report and preliminary design for the six-million gallon covered storage facility.
Final Design/CA/RI	Final design, construction administration, and resident inspection for the construction of the facility.
Construction	Construction of the facility.

Changes in Scope Since FY97-99 CIP	None.

CEB Impact	None.

2109. Fells Reservoir Covered Storage

Purpose

To provide covered storage for the Northern High Service distribution system. This will include the construction of a twenty-million gallon covered storage tank at the Fells Reservoir in Stoneham.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$1,961	May 92	May 99
Construction	$16,024	Jan 97	May 99
DEP Permit Fees	$4	Jan 93	Dec 94
TOTAL:	$17,989		

Project History and Background

The Fells Reservoir is located in Stoneham and is one of the several distribution reservoirs maintained by the Waterworks Division for storage of water supply transported from the source reservoirs. The Fells Reservoir provides water to Melrose, Stoneham, Wakefield, and other communities in the northeast portion of the Northern High Service area.

Open reservoirs within the water distribution system are considered primary water supply sources under the Safe Drinking Water Act and are therefore subject to the Surface Water Treatment Rule. State regulations require that all open distribution reservoirs be covered to prevent airborne, land, and water-borne contamination. On June 11, 1993, the MWRA, MDC, and the Massachusetts Department of Environmental Protection signed a Consent Order which stipulates that covered storage be provided at Fells Reservoir by December 31, 1998. *The current schedule included in this CIP for completion of construction of the Fells Reservoir covered storage facility is consistent with this order. The May 1999 substantial completion milestone for construction extends beyond December 1998 because of incidental pipe work included in the construction contract for the covered storage facility.*

This project includes installation of 20-million gallon covered storage facility at the Fells Reservoir. Work includes rock excavation and foundation work; installation of intake and overflow lines; installation of the tank walls, floor, and roofing; and backfill and landscaping.

The DEP has expressed concern over the potential for cross contamination between the open reservoir basins and the distribution system piping at the bottom of the reservoir. The project scope has been amended to include new 36-inch water mains to replace the existing 50- and 100-year old mains. It is estimated that these mains will cost approximately $613,000. This has been included in the construction budget for this project.

Scope

Phase	Scope
Design/CS/RI-Fells Reservoir	Design, construction services, and resident inspection for the installation of a 20-million gallon covered storage facility at the reservoir.
Construction-Fells Reservoir	Installation of a 20-million gallon buried, reinforced concrete covered storage facility at the reservoir.
DEP Permit Fees	Department of Environmental Protection permits for construction of the pump station and facilities.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction-Fells Reservoir	New 36-inch water mains to replace the existing 50- and 100-year old mains.

CEB Impact

CEB Line Item	Incremental Cost in FY98	Incremental Cost in FY99	Description
Vehicles	$13,000		Crew Transportation
Total	$13,000		

2201. MetroWest Water Supply Tunnel

Purpose To provide transmission redundancy for the Hultman Aqueduct to ensure reliable water delivery and provide sufficient hydraulic capacity to support the new Walnut Hill Water Treatment Plant and new covered storage distribution facilities. This project consists of construction of a 17.5 mile deep rock tunnel from Shaft C in Marlborough to Shaft 5 of the City Tunnel in Weston.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Study	$415	Jun 84	Oct 89
Construction Sudbury Pipe Bridge	$296	Nov 91	Jun 92
Hultman Study	$1,079	Apr 95	Feb 06
Hultman Leak Repair	$260	Aug 96	Dec 96
Hultman Repair Band	$24	Aug 96	Sep 96
Design/EIR/Engineering Services During Construction	$32,170	Apr 92	Jul 05
Construction Management/RI	$31,593	Apr 95	Jul 05
Construction Contracts 1 - 8	$534,330	Jun 96	Jul 05
Land Acquisition	$6,295	Oct 95	Jun 05
Local Supply Contingency Design/CA/RI	$740	May 96	Jun 98
Local Supply Contingency Construction	$4,266	Apr 97	Jun 98
Local Supply Contingency Plan Legal/Easements	$82	May 96	Jun 98
Community Technical Assistance	$395	Jun 95	Apr 98
Professional Services	$500	Nov 95	Jun 99
DEP Permit Fees	$45	Oct 94	Aug 97
Framingham MOU	$2,547	Apr 96	Jun 03

Owner Controlled Insurance	$19,741	Jun 96	Oct 04
Technical Assistance	$71	Jun 84	Feb 06
TOTAL:	$634,849		

Project History and Background

The MWRA's water delivery depends on a system of tunnels and aqueducts which transport water from the Quabbin and Wachusett Reservoirs to the distribution reservoirs in western metropolitan Boston. The existing tunnels and aqueducts are deficient in several respects. First, the transmission system is unable to supply sufficient hydraulic capacity during peak flow periods, leading to pressure deficiencies in all high service areas during the summer months. Secondly, key sections of the transmission system, such as the Hultman Aqueduct and the Southborough Tunnel, rely on only a single conduit. In the event of failure of any of the major transmission sections, the remaining waterworks system could not meet the demand for water.

Redundancy planning and the need to provide adequate transmission capacity to support the Waterworks integrated system plan for improving drinking water quality is the prime reason for transmission system improvements. This plan includes the construction of the new Walnut Hill Water Treatment Plant and new covered storage distribution facilities.

One aspect of this project is to provide reasonable levels of redundancy along the major supply routes required to ensure reliable service delivery, and to construct the MetroWest Water Supply Tunnel and its extension to the Weston Aqueduct Terminal Chamber, to provide the critically needed minimum level of transmission redundancy for the Hultman Aqueduct. Redundancy for the City Tunnel and the City Tunnel Extension will be planned for as part of the Metropolitan Tunnel Loop (project #2204). Redundancy will also enhance system maintenance by allowing each major supply conduit to be taken out of service for inspection, cleaning, and repair.

The project consists of study of the aqueduct/tunnel system; EIR, design, and replacement of the Sudbury Aqueduct and the Weston Aqueduct with the MetroWest Tunnel; design and construction of the new Weston water storage facility; a condition assessment study of the existing Hultman Aqueduct; and design and construction for implementation of a local water supply contingency plan to provide water service to property owners affected by tunnel construction.

The Marlborough, Southborough, Framingham, Wellesley, Needham, and Weston distribution systems are supplied in part or entirely by pumping stations which take suction from the Hultman Aqueduct. The Town of Northborough and Westborough State Hospital, which both take water from the Wachusett Aqueduct, also require alternative connections. As part of the redundancy program, an alternative means of delivering water to these users is essential so that the Hultman may be taken off line for inspection, maintenance, and repair.

In June 1989, the Authority began engineering work on the reconstruction of the Sudbury Aqueduct. Design began as an evaluation of three options: surface reconstruction of the Sudbury Aqueduct with a ten-foot diameter pipe or equivalent with new tunnels to connect it to the existing aqueduct system; tunnel alternatives to the pipe in areas of dense urban development or other sensitive areas such as wetlands, hazardous waste sites, etc.; and an all-tunnel alternative for the entire length of the project.

On May 9, 1990, the Board of Directors directed staff to put minimum effort into further study of the reconstruction of the Sudbury Aqueduct and maximum effort into study of the all-tunnel alternative. The advantages of tunneling include a large reduction in surface activities resulting in a reduced environmental impact, and the potential to obtain a large increase in water transmission capacity which will enable the tunnel to supplant the Weston Aqueduct as well as the Sudbury Aqueduct. Other advantages include a higher pressure rating by constructing a tunnel deeper into rock, and the ability to construct along a straight line thus reducing the overall length of the project by three miles.

In November 1990, the Board of Directors directed staff to eliminate the planned tunnel from Norumbega Reservoir to the Chestnut Hill Reservoir in favor of extending the MetroWest Tunnel from the Norumbega Reservoir to Shaft 5 of the City Tunnel and to the eastern end of the Weston Aqueduct. The extension will allow the Weston Aqueduct and Weston Reservoir to be taken off-line and used only for emergency supply as required by the Safe Drinking Water Act.

Program Elements

The MetroWest Tunnel Project consists of a new 14-foot diameter, 17.5-mile long tunnel. The tunnel will extend from the proposed water treatment plant site at Walnut Hill in Southborough to Shaft 4 of the Hultman Aqueduct in Southborough. From there, the tunnel will continue to a "tee" connection east of Norumbega Reservoir. The tunnel will continue from the "tee" in an eastward direction to Shaft 5 of the City Tunnel and northward to the Weston Aqueduct Terminal Chamber. The tunnel depth will vary from 200 to 500 feet below ground surface along the alignment. (see Transmission System Redundancy Plan at the end of this projecte narrative.)

Following the start up of the MetroWest Tunnel, the Hultman Aqueduct will be inspected and rehabilitated to repair any observed leaks. Surface distribution facilities, including piping, valve chambers, and risers, will connect the tunnel to the Hultman Aqueduct and local community services. Intermediate connections between the MetroWest Tunnel and the Hultman Aqueduct will permit operating segments of either the aqueduct or the tunnel interchangeably, allowing flexibility in the maintenance of the two conduits.

Disposal of Tunnel and Shaft Excavate

Construction of the MetroWest Tunnel will produce more than 1.4 million cubic yards of rock excavate. All 340,000 cubic yards removed from Shaft E will be hauled offsite by truck. At Shaft L, the current plan is to store all 850,000 cubic yards on a portion of the site. Approximately 200,000 cubic yards will be removed from Shaft 5A, mostly from excavation for the 20-million gallon storage tanks. All of the rock from Shaft 5A will be removed by conveyor to a nearby Massachusetts Highway Department site and then removed by truck from that location.

The MetroWest Tunnel and the proposed version of the Metropolitan Tunnel Loop are illustrated on the last page of the narrative for this project.

Scope

Phase	Scope
Study	Study of the aqueduct/tunnel system to determine the best course of action to improve hydraulic capacity and create redundancy.
Construction-Siphon Pipe Bridge	Rehabilitation of the Siphon Pipe Bridge at the Weston Aqueduct which experienced significant leakage.
Design/EIR-Tunnel	Environmental impact process and design of the 17.5-mile long, 14-foot diameter tunnel.
Engineering Services During Construction (ESDC)	ESDC will provide for complete construction support services, including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, and community relations.

Construction: Western Tunnel Segment - CP1	Consists of the western portion of the tunnel alignment and associated surface facilities. Shaft E will be constructed at the Sudbury Dam and a tunnel will be excavated 4.7 miles to Shaft D, located adjacent to the clear well of the Walnut Hill Water Treatment Plant (WTP). A riser shaft will be constructed to connect the tunnel to Southborough's Hosmer Pump Station. The surface piping facilities necessary to bring water from the Wachusett Aqueduct and the Cosgrove Tunnel to the WTP will be part of the WTP project.
Construction: Middle Tunnel Segment - CP2	Approximately 11.9 miles of tunnel between Southborough and Weston will be constructed under this contract. The construction will be staged from Shaft L, which is centrally located at a sand and gravel pit in Framingham, where a permanent connection to the Hultman will be constructed. Along the alignment, four small-diameter shafts will be constructed for community connections to Framingham and Weston. The western reach of the Contract 2 tunnel will terminate at Shaft E. The eastern reach will terminate at the "tee" of Shaft W and Shaft 5A. Shafts NE and NW will be constructed on the east side of Norumbega Reservoir. Surface work under this contract will include valve chambers and surface piping to allow connections to the Hultman Aqueduct and Norumbega Reservoir. The design includes provisions for future connections to the Norumbega Covered Storage facility and the proposed Metropolitan Tunnel Loop.
Construction: Eastern Tunnel Segment - CP3	Includes the eastern portion of the tunnel alignment. Tunnel construction will be staged from Shaft 5A, located near the intersection of Route 128 and the Massachusetts Turnpike. From Shaft 5A, an approximately 2,000-foot long, 12-foot finished diameter tunnel will be constructed westward to connect to the Contract 2 tunnel. From this connection, an approximately 2,500-foot long, 12-foot finished diameter tunnel will be constructed to Shaft W, located adjacent to the Weston Aqueduct Terminal Chamber. Surface work that will be constructed under this contract include connections between Shaft 5A of the MetroWest Tunnel and Shaft 5 of the City Tunnel, and a service connection that feeds Wellesley and Needham.
Construction: Surface Work - CP4	Filed sub-bid work for the MetroWest Tunnel project has been grouped under one contract. This includes work at Norumbega Reservoir such as chemical feed facilities, an intake structure and piping to provide interim connections to the Reservoir, and associated road work. The interim connection is necessary until the Norumbega Covered Storage facility is placed in operation.
Construction: MHD Salt Sheds - CP5	Massachusetts Highway Department (MHD) salt storage operations will be transferred from the Shaft 5A site to a new, nearby location on MHD property on Recreation Road in Weston. This will allow the MHD salt sheds currently located at the Shaft 5A site to be demolished. New salt storage sheds and site grading work will be completed under this contract at the Recreation Road site. MHD office trailers presently located at the Shaft 5A site will be relocated to the Recreation Road site.

Construction: Hultman Interconnection/ Inspection - CP6	Consists of the full inspection and partial rehabilitation of the Hultman Aqueduct, followed by interconnections from the MetroWest Tunnel to the Hultman Aqueduct at Shafts L, 5A, N, and E, as well as a buried connection to the Hultman from Valve Chamber E-2, Valve Chamber E-3, Meter Vault 4 and the access road from Valve Chamber E-2 to Meter Vault 4.
Construction: Testing & Disinfection - CP7	Includes the pressure testing of the MWWST from Shaft E (west) to Shaft W and 5A, and the disinfection of the entire tunnel from Shaft D to Shafts W and 5A.
Construction: Weston Covered Storage-CP8	Surface facilities constructed at the Shaft W site will include a 20-million gallon storage facility that will replace the function of the existing Weston Aqueduct/Weston Reservoir system. This will allow the Weston Aqueduct/Reservoir system to be taken off line and placed on emergency stand-by status. The storage facility will be constructed as two concrete tanks partially buried in a hillside adjacent to Shaft W. Connections will be made under this contract at Shaft W to three WASM Low Service mains and a single WASM High Service main, as well as to the seven-foot diameter branch of the Hultman Aqueduct. Rehabilitation of 4,100 linear feet of 60-inch pipe and four master meters.
Construction Management/ Resident Inspection	The scope of the services will to provide full inspection of all construction elements. The scope will also provide for complete construction support services, including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, and community relations. The CIP also includes funds for the design engineer to provide engineering services during construction. The design engineer will be responsible for reviewing technical submittals by the construction contractor and providing technical assistance relative to the original design.
Hultman Study	Risk analyses to determine which leaks should be repaired now and a monitoring plan for leaks which presently do not threaten the integrity of the aqueduct.
Hultman Leak Repair	Test pit excavation and leak repair on the Hultman Aqueduct.
Hultman Repair Band	Purchase of external repair band for Hultman Aqueduct repair.
Land Acquisition	Easements along the 17.5 mile tunnel construction route, as well as land at the Shaft W and Shaft L sites.
Professional Services	Services required such as: construction safety, contractor audit, legal services, risk management consulting services, and other miscellaneous services.
Community Technical Assistance	Funds to assist communities with the planning and redesign of utility plans.

Local Water Supply Contingency Design/CA/RI	Design of a Water Supply Contingency Plan which will include the installation of new local mains where residential well supplies could be affected by tunnel construction.
Local Water Supply Contingency Construction	Construction of a Water Supply Contingency Plan, including the installation of local mains where residential well supplies are affected by tunnel construction. This phase includes funds for reimbursement of water services.
Local Water Supply Contingency Easements	Legal easements necessary for the Water Supply Contingency Plan.
Owner Controlled Insurance	Owner controlled insurance program providing worker's compensation, and general liability and pollution liability insurance for the MetroWest construction contracts 1 - 8.
Framingham MOU	Funds to mitigate the impacts of the construction of the MetroWest Water Supply Tunnel with the Town of Framingham.

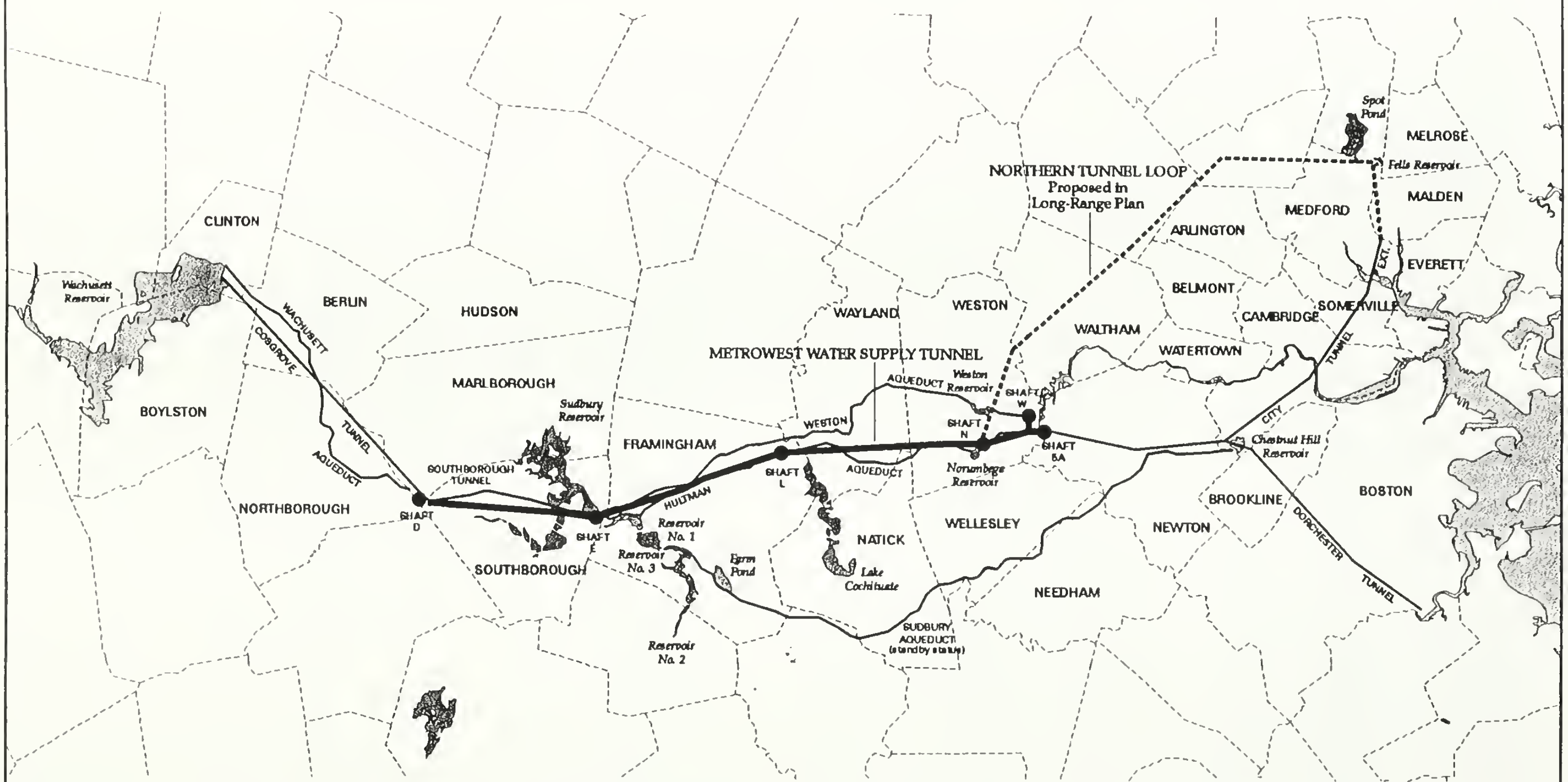
Changes in Scope Since FY97-99 CIP

Phase	**Change**
Western Tunnel Segment - CP1	Changed name from Construction Contract 1. Added bloody bluff allowance, moved work associated with the Hultman Aqueduct connections to CP6, and moved work associated with pressure testing and disinfecting the tunnel to CP7.
Middle Tunnel Segment - CP2	Changed name from Construction Contract 2.
Eastern Tunnel Segment - CP3	Changed name from Construction Contract 3. Moved work associated with the Weston Covered Storage Tanks to CP8.
Surface Work -CP4	Changed name from Construction Contract 4.
MHD Salt Sheds - CP5	Change name from Construction Contract 5.
Hultman Interconnection/ Inspection - CP6	New phase. Formerly part of CP1.
Testing & Disinfection - CP7	New phase. Formerly part of CP1.

Weston Covered Storage Tanks-CP8	New phase. Formerly part of CP3. Moved rehabilitation of 4,100 linear feet of 60-inch pipe and four master meters from WASM 4 Construction WATC and Master Meters.

CEB Impact None.

Transmission System Redundancy Plan



Metrowest Tunnel Construction Contract Breakdown:

CP1 Western Tunnel Segment from Shaft E to SHaft D
CP2 Middle Tunnel Segment from Shaft E to the "wye" east of Norumbega
CP3 Eastern Tunnel Segment including Shaft 5A and W
CP4 Filed sub-bid surface work
CP5 Relocation of MHD salt sheds at Shaft 5A
CP6 Hultman interconnections and inspection
CP7 Tunnel testing and disinfection
CP8 Weston covered storage tanks

2202. Dam Control Valve Replacement

Purpose

To improve the safety and operability of water release valves which are necessary for flood control functions and minimum streamflow requirements. Improvements will involve replacement of valves at Sudbury Reservoir in Southborough and at the Wachusett Dam.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	In-house	Feb 90	Feb 98
Construction	$1,842	Dec 93	Feb 98
TOTAL:	$1,842		

Project History and Background

The MWRA is responsible for the operation and maintenance of the outlet control valves at the Wachusett Dam and Sudbury Reservoir in Southborough. The valves are used for flood control releases as well as for filling the Wachusett Aqueduct, which serves Northborough and Westborough State Hospital, and under emergency conditions would flow into the Hultman Aqueduct. In the past, both the Division of Waterways and the U.S. Army Corps of Engineers have cited the poor condition of the valves and the need to restore operability for flood control. Failure to make repairs could lead to the downgrading of future safety condition assessments of the Wachusett Dam by the Corps of Engineers, as well as increase the risk of casualties and property damage if flood conditions should arise.

There are eight 24-inch valves which control the water releases from the Sudbury Reservoir in Southborough. The valves were installed in 1841 to allow water to be released to either the Weston Aqueduct or Framingham Reservoir No. 3. The inoperable valves presently affect both routine operation and emergency flood control.

Scope

Phase	Scope
Design - Wachusett	Design for the replacement of eight 24-inch diameter and four 48-inch diameter outlet control gate valves.
Construction - Wachusett	Replacement of eight 24-inch diameter and four 48-inch diameter outlet control gate valves.
Design - Sudbury	Design for the replacement of eight 24-inch valves.
Construction - Sudbury	Replacement of eight 24-inch valves.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

None.

2203. Sluice Gate Rehabilitation

Purpose

To improve the condition and operability of sluice gates used for regulating inflows and outflows at various reservoirs. More than 50 manual gates will be replaced by motorized gates at Wachusett Reservoir, Sudbury Reservoir, Framingham Reservoir, and various distribution reservoirs.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$668	Aug 88	Nov 03
Construction	$7,132	Dec 88	Nov 03
TOTAL:	$7,800		

Project History and Background

The Waterworks Division is responsible for the maintenance and operation of the sluice gates at reservoirs located throughout the system. The existing gates are typically 80 - 100 years old, are in poor condition, and must be operated by hand. Problems include gate leakage and corroded tracks which can prevent operation of the gates. The sluice gates regulate water supply intake and release to downstream rivers in accordance with both legislative and flood control requirements. In a Dam Safety Inspection Report by the Army Corps of Engineers, the sluice gates at Wachusett Reservoir and the four Sudbury System Reservoirs were cited as needing repairs to restore operability for flood control use. Failure to make repairs could lead to Corps downgrading of future dam safety assessments at these sites. Other distribution reservoir sites such as Spot Pond and Fells Reservoir also need sluice gate rehabilitation to improve operations.

Scope

Phase	Scope
Design-Stop Planks	Design of the stop planks for all sites.
Construction - Stop Planks	Construction of stop planks at all sites (required to de-water the wet wells) before the sluice gates can be installed.
Design/CS/RI 1	Design the installation of motorized operators, upgrade of the gate houses, and replacement of gates and sliding tracks at Wachusett Reservoir, Sudbury Reservoir, and Framingham Reservoir 3.
Construction 1	Installation of motorized operators, upgrade of gate houses, and replacement of gates and sliding tracks at Wachusett Reservoir, Sudbury Reservoir, and Framingham Reservoir 3.
Design 2	Design the installation of motorized operators, upgrade of the gate houses, and replacement of approximately 30 gates and sliding tracks at various distribution reservoirs.
Construction 2	Installation of motorized operators, upgrade of gate houses, and replacement of approximately 30 gates and sliding tracks at various distribution reservoirs.
Construction - Sudbury Toe Drain Repair	Payment to the MDC for construction of new toe drains, filter blanket and pressure relief wells, repair or abandonment of existing toe drains, and repair of the stone masonry spillway, dam crest roadway, gate house, and wing walls.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction - Sudbury Toe Drain Repair	New phase.

CEB Impact

None.

2204. Metropolitan Tunnel Loop

Purpose

To evaluate the need for and means of providing full redundancy for the City Tunnel, Dorchester Tunnel, and the City Tunnel Extension in order to ensure reliable transmission capabilities and allow for inspection, maintenance, or repair of these facilities if required. Current plans recommend a closed loop tunnel system, as originally planned in 1936 by the system's designers, created by constructing a 16.5-mile deep rock tunnel from Norumbega Reservoir in Weston to Fells Reservoir and the City Tunnel Extension called the Metropolitan Tunnel Loop. A supplemental, or even alternative, plan would be a southern tunnel loop from Norumbega Reservoir to Blue Hill Reservoir and the Dorchester Tunnel. As this study will examine both northern and southern routes as well as other alternatives, it has now been designated the "Metropolitan Tunnel Loop."

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Feasibility Study/Survey	$208	Jun 98	Dec 99
TOTAL:	$208		

Project History and Background

When the pressure aqueduct system was planned in 1936, it was envisioned that the tunnel within the metropolitan area would be configured as a loop consisting of several segments so that any section could be deactivated while the others remained in service. This tunnel system was initially to have a northern loop and ultimately a southern loop.

The City Tunnel and the City Tunnel Extension have no backup facilities and cannot be removed from service for inspection, maintenance, or repair. Major transmission mains along the Dorchester Corridor (Southern Spine) do provide partial backup for the Dorchester Tunnel. Critical isolation valves cannot currently be exercised to keep them in good working order. The many tunnel appurtenances which connect the tunnel shafts to the surface piping are now 30 to 40 years old and will become more prone to malfunction with increasing age. Failures of critical appurtenances could necessitate a tunnel shut down with a possible outage of water service over a widespread area.

Although the Shaft 7 to WASM 3 pipeline project and the rehabilitation of the Southern Spine mains and WASM 4 will provide partial redundancy, the Metropolitan Tunnel Loop is ultimately necessary to obtain total redundancy for the City Tunnel, the City Tunnel Extension, the Dorchester Tunnel, and WASM 3. In addition, the northern portion of the tunnel loop would reduce pumping costs to the Fells Reservoir and the Northern Extra High and Intermediate High areas. With this portion of the tunnel loop in operation, WASM 3 would function as a distribution main, carrying water from the tunnel to the community meters and MWRA pumping stations. A new pumping station on the southern portion of the loop would provide improved service to the Southern Extra High Service Area.

Scope

Phase	Scope
Feasibility Study/Survey	Examine the need and provide justification for a Metropolitan Tunnel Loop, evaluate the practicality of construction of the tunnel in phases to improve system reliability incrementally, and identify alternatives for tunnel alignment and shaft location. Identify major environmental concerns and perform reconnaissance geological assessment of possible tunnel routes.

Changes in Scope Since FY97-99 CIP

Phase	Change
Feasibility Study/Survey	Scope of study has been expanded to consider the southern as well as the northern portion of the tunnel loop.

CEB Impact None.

2206. Chicopee Valley Aqueduct Interconnections

Purpose

To provide backup service connections for the three communities served by the Chicopee Valley Aqueduct (CVA) in case of a CVA failure or shutdown. Interconnections will be made to the water distribution systems of Springfield and Holyoke to facilitate emergency water transfers to Chicopee, Wilbraham, and South Hadley Fire District No. 1.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$924	Jul 00	Oct 04
Construction	$3,029	Jan 03	Oct 04
TOTAL:	$3,953		

Project History and Background

The Chicopee Valley Aqueduct (CVA) supplies water to Chicopee, Wilbraham, and South Hadley Fire District No. 1. The 48-inch and 36-inch diameter aqueduct was built in 1949 of reinforced concrete pipe with an embedded steel cylinder. It is the only means of supplying these communities with water. The capacity of the aqueduct is 23 million gallons per day, which is just sufficient to supply the communities' peak summer demand. Although there is no known evidence of leakage or deterioration, the carrying capacity of the pipeline has been reduced somewhat due to build-up on the interior lining. It is currently not possible to perform routine maintenance without disrupting supply to these communities. Furthermore, should a breakdown occur, there is no other means of supplying these communities with water. Computer modeling indicates that if supply through the CVA is shut off, Chicopee would be without water after two days, and South Hadley and Wilbraham would be without water even sooner.

Chicopee, South Hadley, and Wilbraham pay charges under existing contracts with the MWRA that are less than ten percent of the current prevailing rate. The rates cannot be changed prior to the termination dates in the contracts. At that time, the MWRA and the communities will negotiate new water supply agreements under the MWRA's Regulations for the Continuation of Contract

Water Supply. The regulations require a ten-year term and payment of prevailing rate. No MWRA funds will be expended toward this project until the communities have committed to paying the prevailing rates.

Scope

Phase	Scope
Design/CA/RI	Design, construction administration, and resident inspection of four interconnections to water distribution system in the non-MWRA communities. This design will facilitate transfer of up to 12 mgd to the three contract communities.
Construction	Construction of the four interconnections. The first consists of installation of 6,000 feet of 16-inch diameter water main, meter, and appurtenances to connect Holyoke to South Hadley Fire District No. 1. The second interconnection consists of installation of 6,500 linear feet of 20-inch diameter main from Springfield to Chicopee and construction of a 4.5 mgd pumping station. The third interconnection consists of replacement of valves on an existing water main between Springfield and Wilbraham. A small pumping station consisting of one 40 horse power motor pump would also be constructed to operate during a few evening hours of extreme peak demand. The fourth interconnection consists of a small pumping station allowing treated water to be transferred from Springfield's Ludlow Reservoir into the Chicopee Valley Aqueduct in an emergency.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB line item	Incremental cost in FY02	Incremental cost in FY03	Description
Maintenance	$33,300	$16,700	These facilities are intended for emergency use only. Annual operation and maintenance costs for the two pump stations under emergency conditions are not expected to exceed this amount.
TOTAL:	$33,300	$16,700	

2207. Winsor Dam Hydroelectric

Purpose

To replace switchgear, controls, and turbines at the Winsor Dam in Belchertown. This will allow the dam to produce hydropower which will be used to supply the needs of the MWRA/MDC buildings in the area, including the proposed interim disinfection facility for the Quabbin Reservoir. Excess power could be sold to the grid, or potentially, wheeled to other MWRA facilities.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Permit Study	$40	Sep 97	May 98
Licensing & Detail Design	$41	Aug 98	Oct 99
TOTAL:	$81		

Project History and Background

Currently, hydroelectric power facilities at Winsor Dam are inoperative and unlicensed. If practical, the facilities will be rehabilitated and licensed to generate power - a potential source of revenues. Winsor Dam is in Belchertown and impounds the Quabbin Reservoir. At the dam, an intake feeds two conduits which are interconnected at a powerhouse below the dam. One conduit feeds the currently inoperative turbine/generator unit; the other conduit discharges to Chicopee Valley Aqueduct. Bypass valves allow flow to be discharged directly to the Swift River. Water is required to be released into the Swift River to satisfy minimum daily flow requirements established by existing regulatory requirements.

From 1946 to 1991, hydropower was generated at the site, but in 1991 a fire destroyed the electrical switchgear and rendered the power generation equipment inoperative. Hydropower facilities must be licensed by the Federal Energy Regulatory Commission (FERC). Before the fire, MWRA had made initial efforts to procure necessary permits, however, the effort was discontinued when the fire occurred. In 1995, the FERC regulatory process was resumed when a preliminary permit was issued to MWRA. The purpose of a preliminary permit is to secure a priority position to file a license for development of hydropower. MWRA filed the preliminary permit application in response to a competing preliminary permit issued by another entity. The terms of the preliminary permit issued require MWRA to conduct environmental and engineering studies to assess the project's feasibility.

To generate hydropower at Winsor, the effort will entail more than just replacing the switchgear and controls destroyed by the fire. In 1990, the mechanical and electrical systems were inspected and it was determined that the turbine runner needed replacement because cavitation at low flows had eroded it so badly. The existing turbine, when in operation, rarely delivered its rated output and this resulted in low efficiencies. In addition, prior modes of operation are no longer permitable under current FERC licensing procedures and installation of a new unit may be appropriate. A 24-hour continuous release from the powerhouse will now be required, which is a departure from the previous mode of operation. The selection of equipment and operating parameters will entail a thorough evaluation of water supply requirements, flow and discharges, and turbine/generator applications. While it may be necessary to purchase new units, rather than just rehabilitation of the existing units, no significant civil work is anticipated.

Scope

Phase	Scope
Preliminary Permit Studies	Study to determine project feasibility.
Licensing & Detail Design	Licensing and detail design for hydropower at the Winsor Dam. Work will include replacing switchgear and controls, and turbines.

Changes in Scope Since FY97-99 CIP

Phase	Change
Preliminary Permit Studies	New phase.
Licensing & Detail Design	New phase.

CEB Impact None.

DISTRIBUTION AND PUMPING

PIPELINE REHABILITATION PROGRAM
GENERAL INFORMATION AND OVERVIEW

This section of the CIP describes 31 projects for the rehabilitation and improvement of Waterworks distribution and pumping facilities. Twenty-four of these projects involve rehabilitation of existing pipelines. These pipeline projects are part of a long-range program to restore the system's old water mains to adequate condition. An overview of this program and general information about pipeline rehabilitation needs and methods are provided here as a common preface to the specific information presented in each of the project descriptions.

To assure reliable service, distribution pipelines should be strong and durable, have clean and smooth interiors, and be large enough to pass desired flows without excessive loss of head (pressure). Key factors which typically relate to these characteristics include age, pipe material, and the coefficient of friction (commonly expressed as the C-value).

As pipes age, the effects of stress and deterioration can lead to more frequent leaks, breaks, and malfunctions of valves and other appurtenances. Pipe material composition is a factor because metal pipes lacking interior lining are particularly prone to problems such as excessive corrosion, pitting, and build up of tubercles. The presence of tuberculation is a water quality concern because bacteria can thrive among the tubercles and subsequently be released into the water. Taste, odor, and "rusty water" problems may also result from the build up of deposits. In addition, such deposits reduce the carrying capacity of a pipeline and cause friction and turbulence in the flow. C-value is the standard measure of flow resistance presented by internal pipe conditions, with higher values associated with pipes in better condition. Typically, clean pipes with smooth linings have C-values near 140, while pipes in poorer condition have C-values between 40 and 100.

Due to three decades of deferred maintenance and inadequate capital investment, the metropolitan distribution piping network requires continued rehabilitation and replacement. Presently, the median age of MWRA pipelines is 80 years, and 20 percent of the water mains are more than 100 years old. Approximately 75 percent of the system's 265 miles of pipeline are unlined. Hydraulic modeling indicates that 73 percent of the system's pipelines have C-values below 100, with 38 percent falling below 70.

Direct field experiences, observations, and repair records also confirm that much of the pipeline network is in substandard condition. Of particular concern is the apparent inoperability of many old mainline valves. Mainline valves are essential for the proper control and shut-off of flow, especially during emergency repair situations. Presently, numerous valves along MWRA pipelines may not be fully operational. The Waterworks Operations Department is currently conducting an aggressive valve exercising program to verify which valves can be operated and which require replacement.

Pipeline rehabilitation or renewal can involve three basic approaches. If the pipeline is structurally sound, then the preferred, lowest-cost method of rehabilitation is **cleaning and lining.** This approach entails thorough cleaning of the pipe to remove all internal deposits and installation of a cement-mortar lining. Usually, all valves and appurtenances are replaced during this process.

Another rehabilitation method which reuses the existing pipe is called **sliplining.** This method involves the insertion of a new smaller diameter pipe within the existing main. Sliplining has limited application in instances where the resultant reduction in pipe capacity would not affect system performance.

The third approach to pipeline rehabilitation is conventional **pipe replacement.** This is the most costly form of rehabilitation, but is necessary when existing pipe conditions are so poor that removal of the old pipe and replacement with new pipe is the only worthwhile option.

For planning purposes when structural information is limited, pipeline cost estimates are based on the assumption that the mix of rehabilitation methods for a given pipe length will be one-third replacement and two-thirds cleaning and lining. Subsequently, as projects approach the design phase, a more accurate assessment of rehabilitation requirements is performed and the budget is updated accordingly.

Given the current condition of the distribution piping network, the MWRA has identified a long-range need to rehabilitate nearly 200 miles of pipeline. The Twenty Year Waterworks Master Plan proposes to address this need on a prioritized basis. Thus, the MWRA aims ultimately to rehabilitate/replace on average approximately five to six miles of existing pipeline each year through the CIP. However, it will probably take at least several years for the Waterworks Division to reach and maintain that level of productivity. The 24 pipeline rehabilitation projects outlined in this CIP represent the first stage of this long-term program to renew the system's pipeline network.

2302. Valve Replacement

Purpose

To retrofit approximately 500 existing blow-offs and replace several hundred main line valves within the pipeline distribution system. Blow-off retrofits will eliminate cross-connections into sewers or drainage piping. Main line valve replacements will improve operations response to emergency situations, such as pipe breaks and provide tight shutdown for pipeline construction projects. Faster response will reduce negative impacts on customers. Combining the two valve replacement efforts will reduce repeat construction at each site and will reduce traffic impacts, repaving needs and other site specific impacts.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design	In-house	Sep 89	Jun 06
Construction	$7,246	Nov 95	May 04
Equipment Purchase: Mainline Valves & Linestops	$4,527	Jul 96	Jun 06
Line Stops FY96	$17	Oct 95	Jun 96
Technical Assistance	$2	Oct 95	Jun 06
TOTAL:	$11,792		

Project History and Background

The MWRA owns and operates 265 miles of distribution pipeline which contain approximately 500 inoperable and inadequate blow-off and several hundred main line valves requiring repair or replacement. This project is in part a response to the Massachusetts DEP mandate that no cross-connections are allowed in a distribution system. Currently, blow-off valves are cross-connected into sewers or drainage piping. To ensure that there is no chance of contamination, DEP requires that the blow-off valves be replaced to provide air gaps which ensure that non-potable water cannot reach the level of the blow-off outlet.

Failure of a blow-off valve also results in leakage and loss of water, which occurs in a small percentage of the current valves. Both the blow-off retrofits and main line valve replacements will permit maintenance and pipeline repairs to be performed more efficiently.

In-house crews are used for valve replacement every year, and are scheduled to replace an estimated ten blow-off, and twenty mainline valves per year. Contractors are used every other year to replace an estimated ten blow-off, and ten mainline valves per year.

Scope

Phase	Scope
Design/Phase 1	Design approach is to prioritize valve replacement depending on the level of urgency or risk associated with each valve, and to schedule work on those valves that will not otherwise be replaced during upcoming pipeline rehabilitation projects.
Construction - Phase 1	Construction of 27 blow-off valve retrofits.
Construction - Phase 2	Construction of approximately 10 blow-off valve retrofits and 10 main line valve replacements.
Construction - Phase 3 - 5	Construction of approximately 30 blow-off valve retrofits and 30 main line valve replacements.
Equipment Purchase 2 - 11	Purchase of approximately 20 main line valves per phase for ten phases for replacement work to be done by in-house staff. Also includes the cost of line stops associated with this work.
Line Stops FY96	Cost associated with line stops needed for the replacement of mainline valves by in-house crews
Technical Assistance	Technical assistance in the design and construction of valves.

Changes in Scope Since FY97-99 CIP

Phase	Change
Line Stops FY96	Changed name from Line Stops/Mainline Valves FY96. Removed purchase of mainline valves for FY96 since they were either taken from existing inventories or purchased through the CEB.

CEB Impact None.

2303. Cathodic Protection of Distribution Mains

Purpose

To evaluate the condition of approximately 60 miles of steel pipelines and determine the feasibility of upgrading or installing cathodic protection systems to protect pipelines from corrosion.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study	$215	Apr 95	Jun 00
TOTAL:	$215		

Project History and Background

Approximately 60 miles of MWRA waterworks pipelines ranging from 24 inches to 60 inches in diameter are made of steel and are particularly subject to corrosion from acidic soils, fluctuating groundwater levels (especially where the groundwater is saline), and stray electrical currents. These steel pipelines are located within 26 of the MWRA's 46 water communities.

Cathodic protection reduces deterioration of steel pipelines, thereby increasing pipeline life and deferring the need for complete replacement. Without proper cathodic protection, pipeline leaks and failures increase, causing costly damage to abutters' property and possible loss of service to customers.

Some sections of the existing steel pipes were originally equipped with cathodic protection systems intended to reduce the effects of corrosion. Other steel pipelines had cathodic protection systems installed sometime after the original pipe installation. Still other sections of steel pipeline never received cathodic protection. Proper maintenance requires anode replacement every 15 years. Unfortunately, even existing cathodic protection systems were not maintained, and these systems are now no longer functioning.

Scope

Phase	Scope
Planning Ph. 1	Evaluate the condition of the steel pipelines.
Planning Ph. 2	Determine the amount of restoration and installation of cathodic protection required.

Changes in Scope since FY97-99 CIP

None.

CEB Impact

None.

2305. Boston Low Service Pipe and Valve Rehabilitation

Purpose

To improve the condition and operability of the pipelines comprising the Boston Low Service System. These unlined, cast iron pipelines are more than 120 years old. The mains have numerous non-functional valves, and have experienced frequent breaks. Improvements will include some pipe replacement, cleaning and lining, and selective abandonment of unneeded segments.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Study	$297	Sep 84	Feb 91
Design/CS/RI	$2,986	Jul 92	Apr 07
Phase 1 Equipment Prepurchase	$892	Feb 95	Dec 95
Construction	$18,413	Apr 98	Apr 07
TOTAL:	$22,588		

Project History and Background

The Boston Low Service network serves downtown Boston and surrounding areas. Water delivered by this network accounts for 15% of MWRA use. The Boston Low Service System contains more than 20 miles of old 36- to 48-inch diameter cast iron pipe. The pipes were laid in the 1800s before the advent of heavy vehicles. The pipes are subject to a disproportionate share of major breaks due both to their age and surface loadings in excess of design strength. Pipe breaks result in service disruptions, loss of water, property damage, and even collapse of street pavement. During a pipe repair, the broken section is isolated by closing valves on either side of the break for the purpose of shutting off the water and preventing major water loss. More than 40 percent of the isolation valves on these pipelines are not operational; they are not repairable due to their age. Their condition inhibits the ability to shut down the lines quickly during an emergency.

Rehabilitation of the pipeline and replacement of the valves will improve service reliability, reduce the risk of property damage, and improve water conservation by reducing leakage.

Scope

Phase	Scope
Study - Pipe	Determined the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion. The study revealed that approximately 10.6 miles of pipeline required either cleaning and cement-mortar lining with internal seals installed at pipe joints or other rehabilitation. Three pipelines with a total length of 3.7 miles will be filled with a sand cement slurry and abandoned.
Test Pits	Exploratory excavations completed in Brookline to expose cast-iron pipes at ten sites considered representative of conditions in the overall Boston Low Service System. This was completed in-house.
Phase 1 - Equipment Prepurchase	Equipment purchases for the replacement of valves and other appurtenances near the Chestnut Hill Reservoir Gate House.
Design/CS - Clinton Rd..& Boylston St.	Design and construction services of the rehabilitation and/or abandonment of Clinton Road and Boylston Street lines.
Construction - Clinton Rd..& Boylston St.	Sliplining of the Clinton Road line and the rehabilitation and/or abandonment of Boylston Street lines.
Design/CS - Beacon St.	Design and construction services of the rehabilitation and/or abandonment of the Beacon Street lines, the Beacon/Longwood line, the Harvard Street line, and sections of the East and West Spot Pond Supply Mains in Brookline.
Construction - Beacon St.	Rehabilitation and/or abandonment of the Beacon Street lines, the Beacon/Longwood line, the Harvard Street line, and sections of the East and West Spot Pond Supply Mains in Brookline.
Resident Inspection	Resident inspection for construction of Clinton Rd, Boylston St, and Beacon St.

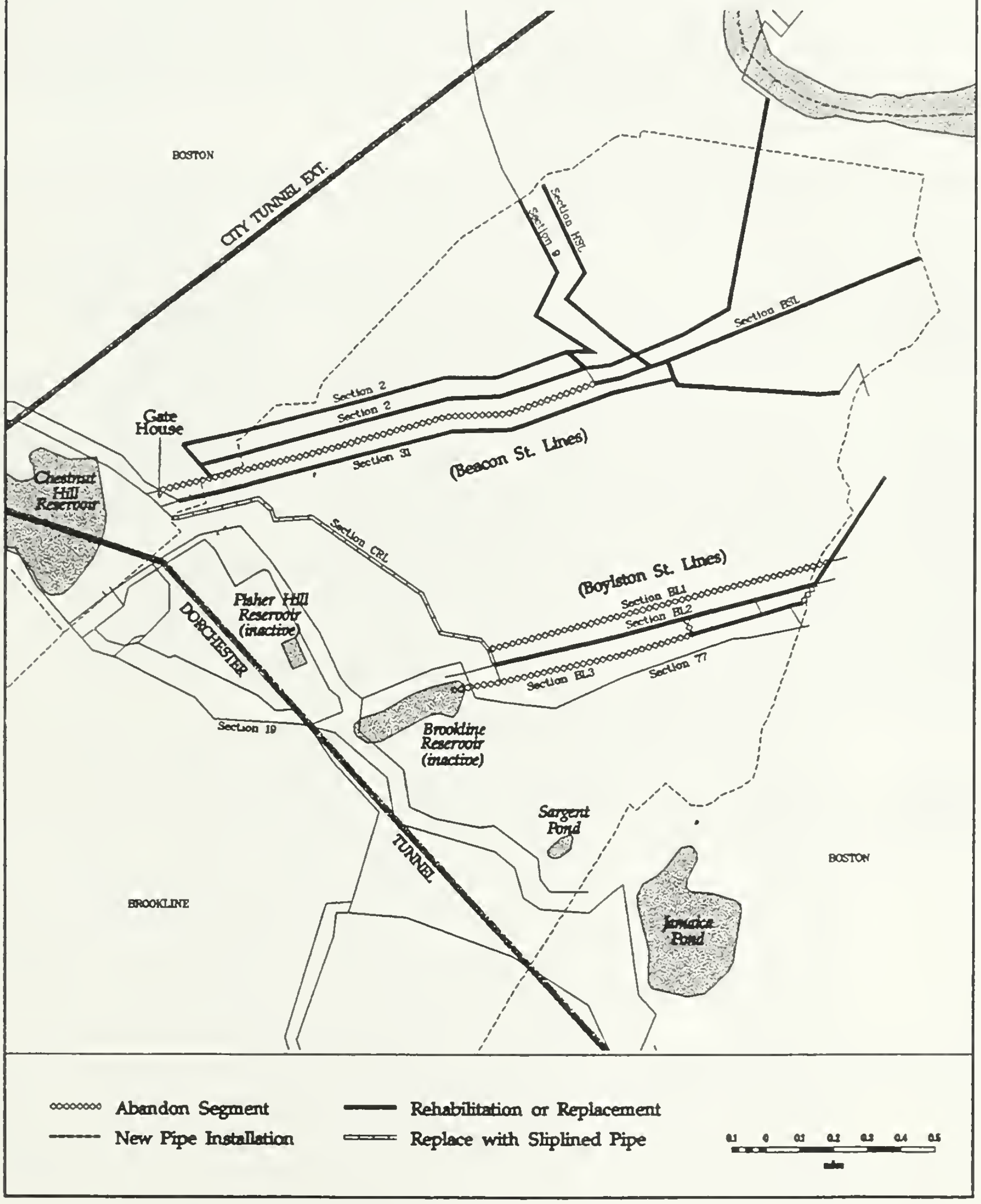
Changes in Scope Since FY97-99 CIP

None.

CEB Impact

None.

BOSTON LOW SERVICE PIPELINE REHABILITATION



2306. Rehabilitation of Weston Aqueduct Supply Mains (WASM) 1 and 2

Purpose

To improve the condition and carrying capacity of these major supply lines serving the Boston Low System. WASM (Weston Aqueduct Supply Main) 1 and WASM 2 are 93- and 84-years old, respectively. Both are unlined, cast-iron mains with poor internal conditions and many inoperable valves. Rehabilitation will address these deficiencies primarily through cleaning, lining, and valve replacement.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$6,049	Aug 97	Feb 08
Easements	$123	Jul 99	Jun 06
Construction	$28,960	Dec 99	Feb 08
TOTAL:	$35,132		

Project History and Background

WASM 1 is a 93 year old, 48-inch diameter pipeline about 87,000 feet long. WASM 2 is an 84 year old, 60-inch diameter pipeline about 34,500 feet long. WASMs 1 and 2 begin in Weston at the Weston Aqueduct Terminal Chamber (WATC) and run parallel through Newton, mostly along Commonwealth Avenue, ending in Boston near Chestnut Hill. These pipelines supply water to the Boston Low pressure zone. A portion of these pipelines have been included in the WASM 4 contract; about 7,200 feet of each line. Rehabilitation of the these WASMs is necessary to restore their original carrying capacity, replace and add new valves, eliminate tuberculation on the interior walls, and apply cement mortar lining to the interior pipe wall to prevent further internal corrosion. WASMs 1 and 2 are currently functioning below their full carrying capacity; C-Values are 70 and 83, respectively, due to a build up of rust deposits and other matter along the pipeline walls, and undersized mainline valves.

Existing valves will be replaced and additional valves will be incorporated into the pipelines to provide more efficient operations or emergency response. With new valves, the ability to respond to emergencies requiring isolation or re-routing of flow will be greatly enhanced, thereby reducing the damage, cost, and risk associated with a pipeline break.

Scope

Phase	Scope
Design/CA/RI	Exploratory excavation and corrosion analysis will evaluate the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion. Design, Construction Administration, and Resident Inspection of approximately 31,600 linear feet of 48-inch pipeline and approximately 27,300 linear feet of 60-inch pipeline.
Easements	Easements along the construction route for all three construction contracts.
Construction - Commonwealth Ave. WASMs 1 and 2	Rehabilitate approximately 12,500 linear feet each of 60-inch and 48-inch pipeline of WASMs 1 (SPL 2) and 2 (SPL 5 & 6), respectively, from the Mass Pike to Bullough Parkway along Commonwealth Avenue in Newton.
Construction - Commonwealth Ave. WASM 2	Rehabilitate approximately 5,800 linear feet of 60-inch pipeline of WASM 2 (SPL 6) from Bullough Parkway along Commonwealth Avenue to Grant Avenue in Newton. Rehabilitate approximately 1,200 linear feet of 48-inch pipeline of WASM 1 (SPL 3) along Centre Street in Newton.
Construction - Newton and Brighton	Rehabilitate approximately 17,900 linear feet of 48-inch pipeline of WASM 1 (SPL 3 & 4). This includes work from Centre Street across the golf course to Commonwealth Avenue in Newton; Commonwealth Avenue and Bullough Parkway to Centre Street in Newton: and Commonwealth Avenue in Brighton. Rehabilitate approximately 9,000 linear feet of 60-inch pipeline of WASM 2 (SPL 7 & 8). This includes work from Grant Avenue across to the golf course Commonwealth Avenue and Commonwealth Avenue in Brighton.

Changes in Scope Since FY97-99 CIP

Phase	Change
Easements	Changed name from land acquisition.

Construction - Commonwealth Ave. WASMs 1 and 2	Reduced 6,000 linear feet of 60-inch pipe to 5,800 linear feet and increased 1,000 linear feet of 48-inch pipe to 1,200 linear feet.
Construction - Newton and Brighton	Reduced 18,300 linear feet of 48-inch pipe on WASM 1 to 17,900 linear feet of 48-inch pipe. Also reduced 10,000 linear feet of 60-inch pipe on WASM 2 to 9,000 linear feet of 60-inch pipe.

CEB Impact None.

2307. Nonantum Road Pipe Rehabilitation

Purpose

To repair a deteriorated section of the Nonantum Road Pipeline in Brighton that experiences frequent leakage. This line is part of Weston Aqueduct Supply Main (WASM) 4, and serves Newton, Watertown, Somerville, Medford, Everett and Chelsea. Work will include rehabilitation of the pipeline section that is exposed to harsh and corrosive conditions.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	In-house	Jun 87	Mar 97
Construction	$1,939	Mar 96	Mar 97
Technical Assistance	$15	Jan 91	Mar 97
Equipment Purchase	$157	Jan 91	Dec 92
TOTAL:	$2,111		

Project History and Background

The Nonantum Road Pipeline is in Brighton and serves Newton, Watertown, Somerville, Medford, Everett and Chelsea. The pipeline is subject to corrosive soils which have weakened and corroded the steel pipe, resulting in frequent leaks.

Scope

Phase	Scope
Site Survey	Survey of the pipeline site in Brighton.
Preliminary Design	Initial design of the rehabilitation of the 6,200 linear feet of the 60-inch water pipeline.

Final Design	Final design of the pipeline rehabilitation.
CS/RI	Construction services and resident inspection of the pipeline rehabilitation.
Construction	Rehabilitation of the pipeline; approximately 3,500 linear feet will be sliplined with new linear pipe, 120 linear feet will be replaced, and approximately 2,580 linear feet will be cleaned and lined.
Equipment Purchase	Purchase of equipment for 2,600 linear feet of 8-inch diameter pipeline constructed by in-house crews to the MDC skating rink.
Technical Assistance	Technical assistance in completing the pipeline rehabilitation.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2309. Warren Cottage Line Rehabilitation

Purpose

To improve the carrying capacity and internal condition of the Warren Cottage Line which services a portion of Boston via the Southern High Service System. Improvements, which will also strengthen the surface connection between Shafts 7B and 7C of the Dorchester Tunnel, will include cleaning and lining to remove build up of rust deposits.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	In-house	Jan 97	Jul 01
Easements	$12	July 00	Jun 01
Construction	$1,507	Aug 00	Jul 01
TOTAL:	$1,519		

Project History and Background

The Warren Cottage Line is part of the Southern High Service System in Brookline and Boston. The 131-year old pipe is approximately 5,700 linear feet and extends from the Fisher Hill Reservoir in Brookline to Boston Meter 6. It has been estimated that the line has approximately 50 percent of its original carrying capacity (C-Value: 68) due to the build up of rust deposits and other matter along the pipeline walls.

Scope

Phase	Scope
Design	Exploratory excavation and corrosion analysis to evaluate the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion. Design of the pipeline.
Easements	Acquisition of easements required for rehabilitation of the pipeline.
Construction	Rehabilitation of 5,700 linear feet of 30-inch unlined cast iron pipe consists primarily of cleaning and cement mortar lining and replacement of all gate valves, blow-off valves, and other appurtenances.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2310. Southern Service Improvements

Purpose

To improve the reliability and capability of key facilities serving the Southern and Southern Extra High systems. These facilities include the Newton Street Pump Station, the Hyde Park Pump Station, and adjoining pipelines which supply Brookline, Milton, Quincy, Canton, and part of Boston. Improvements will be made to the Newton Street Pump Station, existing yard piping in both Newton Street and Hyde Park will be replaced, and new suction and discharge pipelines will be constructed for both pump stations.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RIs	$2,656	Apr 82	Aug 00
Construction	$11,047	May 90	Aug 00
Easements	$28	Jul 98	Nov 98
Permits	$10	Oct 96	Nov 96
Technical Assistance	$31	Jul 90	Aug 00
TOTAL:	$13,772		

Project History and Background

The Southern High and Southern Extra High Service pipelines, which receive water from the Hyde Park and Newton Street pump stations, supply a service region which includes Brookline, Milton, Quincy, Norwood, much of Boston, and part of Canton. The Hyde Park Station was built in the 1890s. The Newton Street Pump Station was constructed in the 1950s. The pumps at the Newton Street Pump Station and the yard piping at both stations are undersized to meet the current and future water supply needs of the service region. In addition, the pipelines suffer from corrosion, and portions have insufficient capacity and strength for the supply and pressure required to ensure service delivery.

Scope

Phase	Scope
Design Hyde Park Ave - Yard Pipe	Design the replacement of yard piping at the Hyde Park Pump Station.
Design/CS/RI - Hyde Park Ave.	Design the construction of 7,100 linear feet of new 36-inch pipe.
Construction -Hyde Park Pipeline	Construct 7,100 linear feet of new 36-inch pipe.
Easements - Hyde Park Pipeline	Easements needed along the construction route.
Hyde Park Pipeline Permit/Road Restoration	City of Boston road opening permits and surface restoration deposit for approximately 60 vacuum excavations to locate existing utilities to facilitate the design of the pipeline.
Design/CS/RI - Newton St. Pump Station	Design, construction services, and resident inspection for major rehabilitation of the pump station including new pump units, redundant piping, isolation valves to prevent flooding, emergency generators, replacing building systems, and building and site refurbishment.
Construction - Newton St. Pump Station-Phase 1	Provide immediate upgrades of mechanical/electrical systems, and minor building improvements.
Construction - Newton St. Pump Station-Phase 2	Replace pumping units, electrical and mechanical systems, redundant piping, isolation valves, install an emergency generator, and complete building and site refurbishment.
Design/CS/RI - 94 & 96	Design 5,600 linear feet of 30- to 36-inch suction pipeline to the Newton Street Pump Station and 7,500 linear feet of 30-inch suction pipeline to the Hyde Park Pump Station.
Construction - Section 96	Construction of 5,600 linear feet of 30- to 36-inch suction pipe to the Newton Street Pump Station.
Construction - Section 94	Construction of 7,500 linear feet of 30-inch suction to the Hyde Park Pump Station.
Boston Paving	Final road restoration of 7,500 linear feet along American Legion Highway in Boston associated with Section 94 construction.
Technical Assistance	Technical assistance for construction of the Newton Street Pump Station and adjoining pipelines.

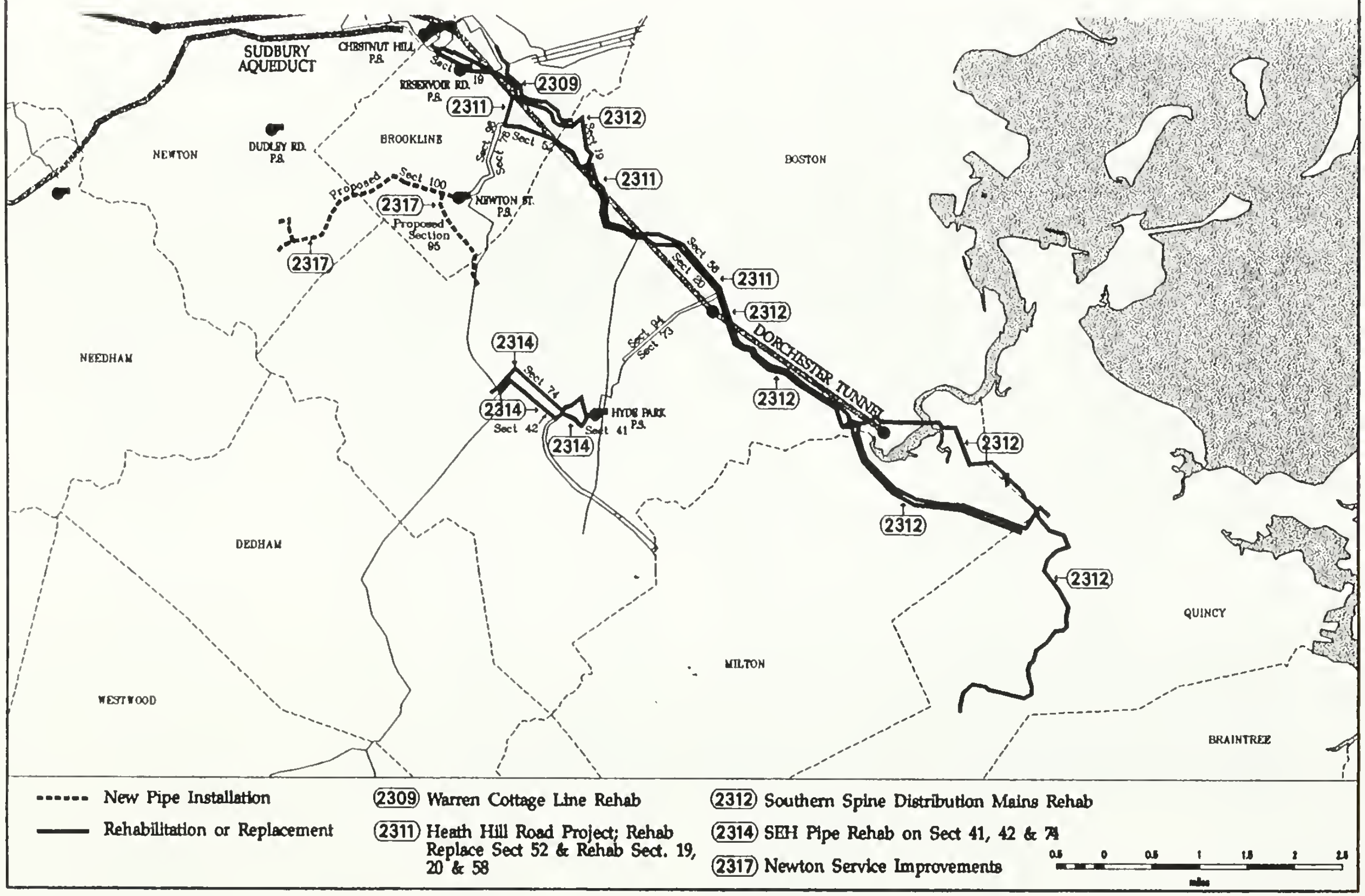
Changes in Scope Since FY97-99 CIP

Phase	Change
Construction - Hyde Park Ave Yard Piping	Deleted this phase since the work was included in the Rehabilitation of Other Pump Station project.
Construction - Hyde Park Pipeline	Changed 7,500 linear feet of new 30 - to 36-inch pipe to 7,100 linear feet of new 36-inch pipe.
Easements - Hyde Park Pipeline	New phase.
Hyde Park Pipeline Permit/Road Restoration	New phase.

CEB Impact

CEB line item	Incremental cost in FY98	Description
Electricity	$39,400	Change from diesel to electricity.
Diesel	($10,000)	Change from diesel to electricity.
Maintenance	$0	Preventive maintenance.
Vehicle	$12,000	Crew transportation.
Total	$41,400	

SOUTHERN SERVICE PIPELINE PROJECTS



2311. Heath Hill Road Pipe Replacement

Purpose

To repair and improve pipelines and valves which are in poor condition in the Southern High and Southern Extra High Service areas. The targeted pipelines in Brookline and Boston have experienced numerous leaks and breaks, and their hydraulic performance is inadequate. Work will include a fast-track pipe replacement phase, and mostly cleaning and lining along the other pipe segments.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$2,681	May 89	Mar 03
Construction	$11,053	Apr 96	Mar 03
Easements	$42	Jan 95	Nov 01
Technical Assistance	$7	May 89	Mar 03
TOTAL:	$13,783		

Project History and Background

These sections of pipeline near Heath Hill Road supply water to Brookline, Boston, and the Southern Extra High Service System. The severe corrosion on Sections 19, 20, 52, and 58 has resulted in 23 leaks during the last ten years. This project consists of the rehabilitation and/or replacement of these pipelines. Section 58 is 60 years old, and Sections 19 and 20 are 100 years old. All sections have extensive records of leaks and breaks and warrant rehabilitation or replacement. These 36- and 48-inch diameter cast iron and steel mains run parallel to the Dorchester Tunnel and serve as a suction main to the Hyde Park Pump Station which supplies the Southern Extra High System. The 54-inch steel main section 52 extends from Chestnut Hill Pump Station to Sections 19, 20 & 58 and provides suction to the Newton Street Pump Station.

Scope

Phase	Scope
Design/CS/RI - Section 52 Replacement	Design and related construction services for the replacement of 820 linear feet of existing pipe with new 54-inch diameter pipe and the installation of a new butterfly valve.
Construction 52 Replacement	Replacement of a portion of Section 52 and the installation of a new butterfly valve.
Design/CS/RI - Section 52 Rehabilitation	Design and related construction services for the removal and replacement of existing pipe and valve connections along Section 52 and cement mortar lining of approximately 12,500 linear feet of 54-inch steel pipe.
Construction - Section 52 Rehabilitation	Rehabilitation of a portion of Section 52 steel pipe and replacement of valve connections.
Des/CS/RI - Sections 19, 20, & 58	Design and related construction services for the rehabilitation of approximately 11,000 feet of 36-inch diameter and 10,000 feet of 48-inch diameter segments of Sections 19, 20, and 58.
Construction - Sections 19, 20, & 58	Rehabilitation of approximately 11,000 feet of 48-inch diameter and 10,000 feet of 36-inch diameter segments of Sections 19, 20, and 58. Also includes valve, meter, and vault construction at Shaft 7C to incorporate all hazardous material work at Shaft 7C into one contract.
Legal / Easements - Rehabilitation	Easements along the construction route for Section 52 Rehabilitation.
Legal / Easements - New	Easements along the construction route for Section 52 - New.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction Sections 19, 20, & 58	Deleted work associated with the valve chamber.

CEB Impact

None.

2312. Southern Spine Distribution Mains

Purpose

To increase carrying capacity and improve valve operability along the large surface mains which run parallel to the Dorchester Tunnel in providing service to the Southern High and Southern Extra High systems. Currently these spine mains have serious hydraulic deficiencies and many inoperable valves. Hydraulic performance improvements are needed to provide redundancy for the Dorchester Tunnel. Work phases will include rehabilitation of more than 12 miles of large diameter pipeline.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$6,360	Nov 98	Nov 09
Easements	$182	Jul 2002	Jun 2000
Construction	$29,814	Mar 03	Nov 09
TOTAL:	$36,356		

Project History and Background

The Southern Spine Distribution Mains comprise the surface piping which parallels the Dorchester Tunnel. The mains begin in the vicinity of Shaft 7B in Brookline and end at the Blue Hills Reservoir in Quincy. The mains serve the Southern High and Extra High System communities of Boston, Brookline, Milton, Quincy, Norwood, and Canton.

Because of the poor conditions of the valves, Waterworks Operations staff frequently have to close several valves in order to shut down the line. This practice often results in closing more of the system than is otherwise necessary. These pipelines are currently functioning at approximately 50 percent of their original carrying capacity (C-Values: 60-70) due to the build up of rust deposits (tuburcules) and other matter along the pipeline walls. In their present condition, these mains could not provide adequate service to users if the Dorchester Tunnel was taken off-line.

Scope

Phase	Scope
Phase 1 Design/CS/RI Sections 21, 22 & 43	Exploratory excavation and corrosion analysis performed during the preliminary design phase will evaluate the structural integrity of the pipe, the conditions of the bedding material, and the extent of pipe corrosion. Design, construction services and resident inspection for the rehabilitation of 30,000 linear feet of 48-inch main, and 24,500 linear feet of 24-inch main.
Easements-Sections 21, 22 & 43	Acquisition of property and/or easements required to complete sections 21, 22 & 43.
Construction - Sections 21, 22 & 43	Rehabilitation of 30,000 linear feet of 48-inch main, and 24,500 linear feet of 24-inch main. Rehabilitation is expected to consist of cleaning and cement mortar lining the interior pipeline wall, as well as replacing all the mainline valves, blow-off valves, and appurtenances.
Phase 2 Design/CS/RI Section 19	Design, construction services and resident inspection for the rehabilitation of 13,400 linear feet of 48-inch main.
Easements - Section 19	Acquisition of property and/or easements required to complete Section 19 work.
Construction - Section 19	Rehabilitation of 13,400 linear feet of 48-inch main. Rehabilitation is expected to consist of cleaning and cement mortar lining of the interior pipeline wall, as well as replacing all the mainline valves, blow-off valves, and appurtenances.
Phase 3 Design/CS/RI Section 20 & 58	Design, construction services and resident inspection for the rehabilitation of 21,000 linear feet of 36-inch main.
Easements - Section 20 & 58	Acquisition of property and/or easements required to complete sections 20 & 58 work.
Construction - Section 20 & 58	Rehabilitation of 21,000 linear feet of 36-inch main. Rehabilitation is expected to consist of cleaning and cement mortar lining the interior pipeline wall, as well as replacing all the mainline valves, blow-off valves, and appurtenances.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2314. Southern Extra High - Sections 41, 42 and 74

Purpose

To increase the hydraulic carrying capacity of the mains that carry pumped water to the Bellevue Tanks, which serve the Southern Extra High System. Because Sections 41, 42 (80-year old cast iron mains) and 74 (45-year old prestressed concrete cylinder pipe) are severely limited in the pressures and flows they can convey, the Hyde Park Pump Station cannot operate efficiently. Improvements will include pipeline replacement and rehabilitation.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$1,307	Mar 97	Feb 02
Easements	$67	Jul 00	Jun 01
Construction	$6,379	Nov 00	Feb 02
TOTAL:	$7,753		

Project History and Background

Sections 41 and 42 were built in 1914 of unlined, cast-iron 20-inch pipe. Section 74 was built in 1951 of prestressed concrete cylinder pipe. These mains connect the Hyde Park Pump Station to Bellevue Tanks 1 & 2 and also serve to connect the Newton Street Pump Station discharge pipeline (Section 77) to Bellevue Tanks Number #1 and #2. These pipe sections pass through the Hyde Park section of Boston and serve Norwood, Canton, Brookline, Milton, and Boston. They were installed prior to the construction of Bellevue Tank #2, and which stands 25 feet higher than Bellevue Tank #1. Section 41 and 42, and portions of Section 74, were not designed for the increased pressure caused by the higher height of Bellevue Tank #2. As a result, the Hyde Park Pump Station is never operated at full capacity unless the Tank #2 water level is extremely low. Since the Southern Extra High Service System has only a small quantity of storage, it is undesirable to have Tank #2 at a low level. Therefore, the pump station operates below capacity despite the fact that pressure in the system is barely sufficient to meet peak demand.

Due to the higher pressures when Bellevue Tank #2 came on line, these pipe are susceptible to breaks. Approximately 10,600 feet of Sections 41, 42, and 74 will be replaced and approximately 5,700 feet of Section 74 will be rehabilitated with new valves and appurtenances.

Scope

Phase	Scope
Design/CS/RI	Design, construction services and resident inspection for replacement of Sections 41, 42, & 74.
Easements	Easements along the construction route.
Construction	Replacement of Sections 41 & 42 with 8,000 feet of new 24-inch diameter main, and a portion of Section 74 with about 2,700 feet of new 24-inch diameter pipe. Rehabilitation of 6,400 feet of 20-inch diameter main of Section 74.

Changes in Scope Since FY97-99 CIP

Phase	Change
Design/CS/RI and Construction	Changed replacement of 8,300 linear feet of 24-inch pipe on Sections 41 & 42 to 8,000 linear feet; and changed the replacement of 900 linear feet of 24-inch pipe and the rehabilitation of 5,300 linear feet of 24-inch pipe on Section 74 to the replacement of 2,700 linear feet of 24-inch pipe and the rehabilitation of 6,400 linear feet of 20-inch pipe on Section 74.
Easements	Changed phase name from Land.

CEB Impact None.

2315. Chestnut Hill Connecting Mains

Purpose

To simplify the complex arrangement of old pipes near Chestnut Hill for safety and operability, and to create a connection between Shaft 7 of the City Tunnel and the Southern Distribution surface mains for redundancy along the Dorchester Tunnel. Restructuring of the piping arrangement will be achieved by constructing several new pipelines, rehabilitating some older pipelines, replacing pressure regulating valves, and abandoning pipes and valves which are no longer needed for service.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Routing Study	$456	Jan 98	Aug 98
Design/CA/RI	$1,821	Jan 00	Jan 06
Easements	$37	Jul 03	Jun 04
Construction	$8,749	Jul 04	Jan 06
TOTAL:	$11,063		

Project History and Background

At Chestnut Hill, the City Tunnel divides into two branches: the City Tunnel Extension going north to supply the Northern High System, and the Northern Intermediate High System and the Dorchester Tunnel which go south to supply the Southern High System and the Southern Extra High System.

There are two shafts in this area: Shaft 7 on the City Tunnel, which is located immediately west of the Chestnut Hill Reservoir, and Shaft 7B on the Dorchester Tunnel, located immediately east of the reservoir. At each of these shafts, two newer pipes extend to connect to the older pipelines of the Boston Low and the Northern Low Service Systems and the Southern High Service System to supply these systems with water from the tunnel.

The Southern High System can only be supplied from Shaft 7B. If the Dorchester Tunnel were to be out of service, it would be necessary to activate the Sudbury Reservoir System, transmit water from there via the Sudbury Aqueduct (currently on standby) to the Chestnut Hill Reservoir (currently on standby) and utilize pumps in the Chestnut Hill Pump Station to pump water from the reservoir to the Southern High System. This water would not be of acceptable quality and would require a boil order.

The older pipes in the area were originally designed to be supplied from the Cochituate and Sudbury Aqueducts, the Chestnut Hill Reservoir, or the Chestnut Hill High Service and Low Service Pump Stations. None of these facilities are presently in normal use. The pipe network is not only old and inordinately complex, but it is not designed to take water from the two tunnel shafts which are the present source of supply.

Scope

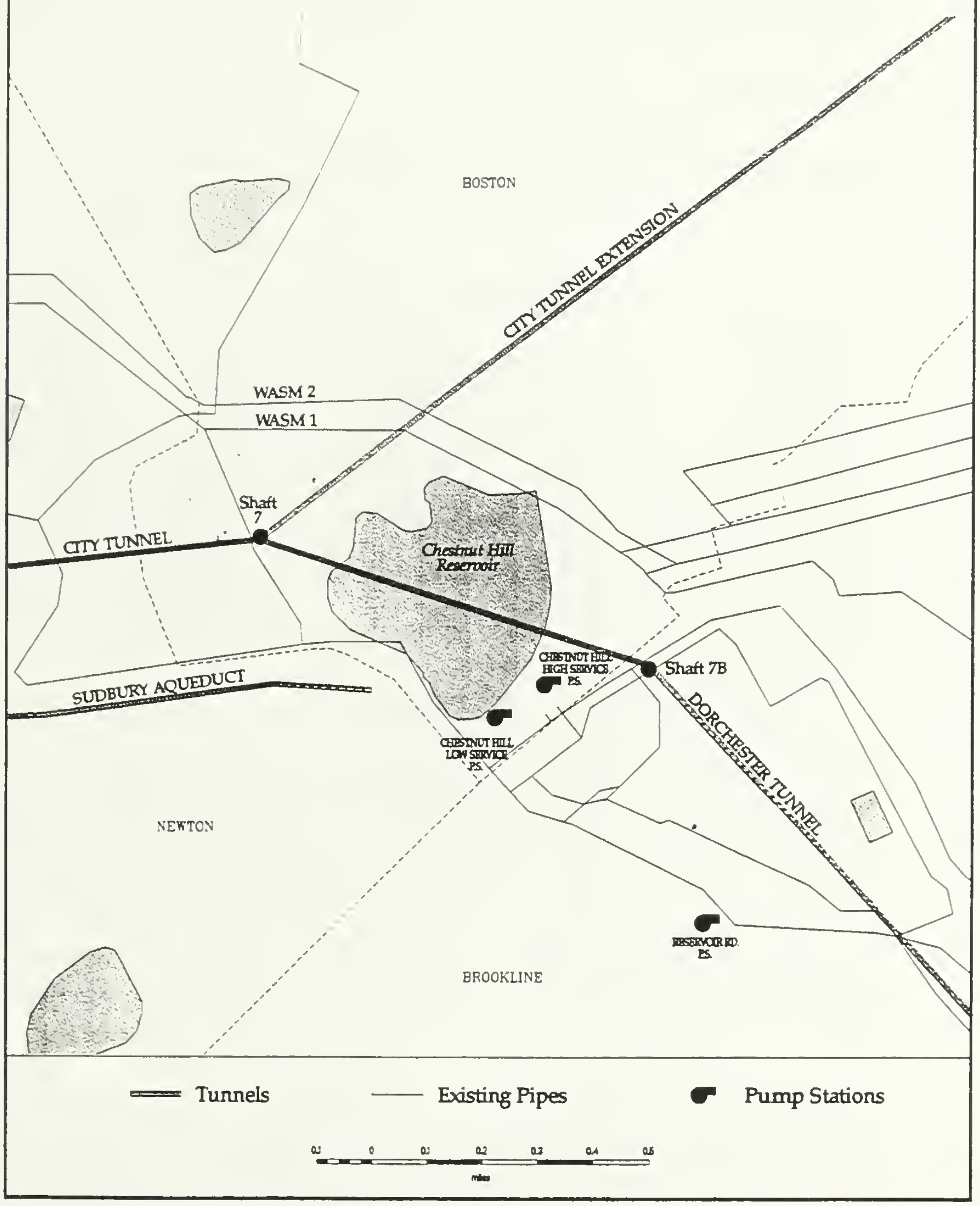
Phase	Scope
Routing Study	Technical and financial analysis of several proposed options will result in the selection of the least cost, technically feasible alternative which meets the objectives of the project.
Design/CA/RI	Design, construction administration, and resident inspection for the rehabilitation of 1,980 linear feet of 48-inch pipe, 2,400 linear feet of 36-inch pipe, and two Fisher Hill pipelines: one that is 1,150 linear feet of 30-inch pipeline and the other, 2,000 linear feet of 36-inch pipeline, installation of 1,160 linear feet of 36-inch pipeline, sliplining 9,000 linear feet of the Cochituate Aqueduct, and construct a new building to house the emergency pumps.
Easements	Easements along the construction route.
Construction	Rehabilitation and installation of these pipelines, as well as the construction of a building to house the emergency pumps.

Changes in Scope Since FY97-99 CIP

Phase	Change
Design/CA/RI and Construction	Added work to design and construct the sliplining of the Cochituate Aqueduct and the new building to house the emergency pumps.

CEB Impact None.

PIPE DISTRIBUTION NETWORK AROUND CHESTNUT HILL RESERVOIR AND PUMP STATIONS



Pipe Distribution Network Around Chestnut Hill Reservoir and Pump Station

2317. Newton Service Improvements

Purpose

To provide a new means of supply to Newton's Oak Hill Tank so that the antiquated Dudley Road Pump Station can be abandoned. This new pipeline will also provide redundancy in case of a breakdown at the Commonwealth Avenue Pump Station.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	In-house	Feb 92	May 99
Easements	$67	Jul 96	Jun 97
Construction	$7,360	Jul 97	May 99
Technical Assistance	$8	Oct 93	May 99
Tree Removal	$7	Oct 95	Dec 95
TOTAL:	$7,442		

Project History and Background

With a population of 82,585, Newton is the second largest water customer. Approximately 85 percent of the water delivered to Newton is pumped from the Commonwealth Avenue Pump Station, which connects to the City Tunnel through a single connection at Shaft 6. Although the Commonwealth Avenue Pump Station Rehabilitation Project will provide redundant pumping and power capacity, the single connection to the City Tunnel has proven to be inadequate. In 1990, a valve failed on the pipeline which connects Shaft 6 to the pump station, disrupting water supply to Newton for one half of a day.

The Oak Hill section of Newton is presently served by the Dudley Road Pump Station. The station is antiquated, and while the flows and pressures to the service area are adequate under average flow conditions, the station is unable to meet the fire flow service goal for the area. Rather than rehabilitate this station, the MWRA plans to serve the Oak Hill area with a new pipeline connected to the Newton Street Pump Station in Brookline.

Because the suction pipes for the Newton Street Pump Station connect directly to the Dorchester Tunnel, this project will improve reliability and redundancy for both the connection to the City Tunnel and the pump station.

A possible future phase would involve installation of 5,700 linear feet of new 24-inch diameter pipeline connecting from Section 75 to Section 24 at Mamet Road in Newton. The new connection, together with rehabilitation improvements described in the New Connecting Mains-Shaft 7 to WASM 3 project (project #2329), would unify the Intermediate High service zones in Arlington and Newton. Hydraulic performance would be improved and reliability would be enhanced. Discussions are planned to incorporate the Newton Covered Reservoir into this future scenario. No funds are budgeted for this future phase.

Scope

Phase	Scope
Design/CS/RI Sections 95 & 100	Design of a new pipeline connected to the Newton Street Pump Station in Brookline to serve the Oak Hill area in Newton.
Easement	Acquisition of property required to complete the project.
Construction Sections 95 & 100	Installation of 11,278 linear feet of new 24-inch pipeline (Section 100) west from Brookline to the Oak Hill service area in Newton. In addition, 7,350 linear feet of new 30-inch diameter pipeline (Section 95) will be installed, which will run parallel to Section 78. Also, meter # 157 will be rehabilitated. Section 95 has been re-routed to avoid poor soil conditions, and combined with the Oak Hill project under a single construction contract.
Technical Assistance	Technical assistance for the design and construction of the pipeline.
Tree Replacement	Removal of a tree which is in conflict with the proposed suction main.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2318. Commonwealth Avenue Pump Station Modernization

Purpose

To modernize and improve this 45-year old station which serves a major portion of Newton. The station presently is undersized, has obsolete pumps and motors, and is susceptible to power failures. Improvements will include building upgrades, a new diesel generator, larger pumps and motors, and installation of telemetry.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$1,740	Feb 88	Jun 99
Land/Appraisal/DEP Fees	$25	Jul 95	Sep 98
Construction	$4,948	May 90	Jun 99
Technical Assistance	$22	Feb 88	Jun 99
PCB Abatement	$50	Apr 96	Jun 97
TOTAL:	$6,785		

Project History and Background

The Commonwealth Avenue Pump Station is a 45-year old facility serving Newton. The station's three electric pumps and motors are undersized and nearing the end of their useful lives. The facility is also susceptible to power failure which can result in interruptions in service. Modernization of the pump station will provide the City of Newton with reliable water service delivery.

The major elements of this project include improvements within the existing station and construction of an adjacent building to increase pumping capacity and reliability.

Scope

Phase	Scope
Preliminary Design	Design of the pump station improvements and of the construction of an adjacent building which will include a new diesel generator and two new ten mgd pumps and electric motors to increase pumping capacity.
Design/CS/RI	Final design of the improvements to the pump station
Appraisal	Appraisal of the land necessary for acquisition to complete the project.
Land	Acquisition of land required to complete the project.
DEP Fees	Fees to the Department of Environmental Protection.
PCB Abatement	PCB remediation prior to construction.
Construction Phase 1	Immediate system upgrades to the pump station.
Construction Phase 2	Rehabilitation, including the installation of two pumps and electric motors, as well as new piping and controls. Modernization will also consist of the addition of monitoring equipment, ventilation, and a security system. The new building adjacent to the existing pump station will include a new diesel generator and two new ten mgd pumps and electric motors.

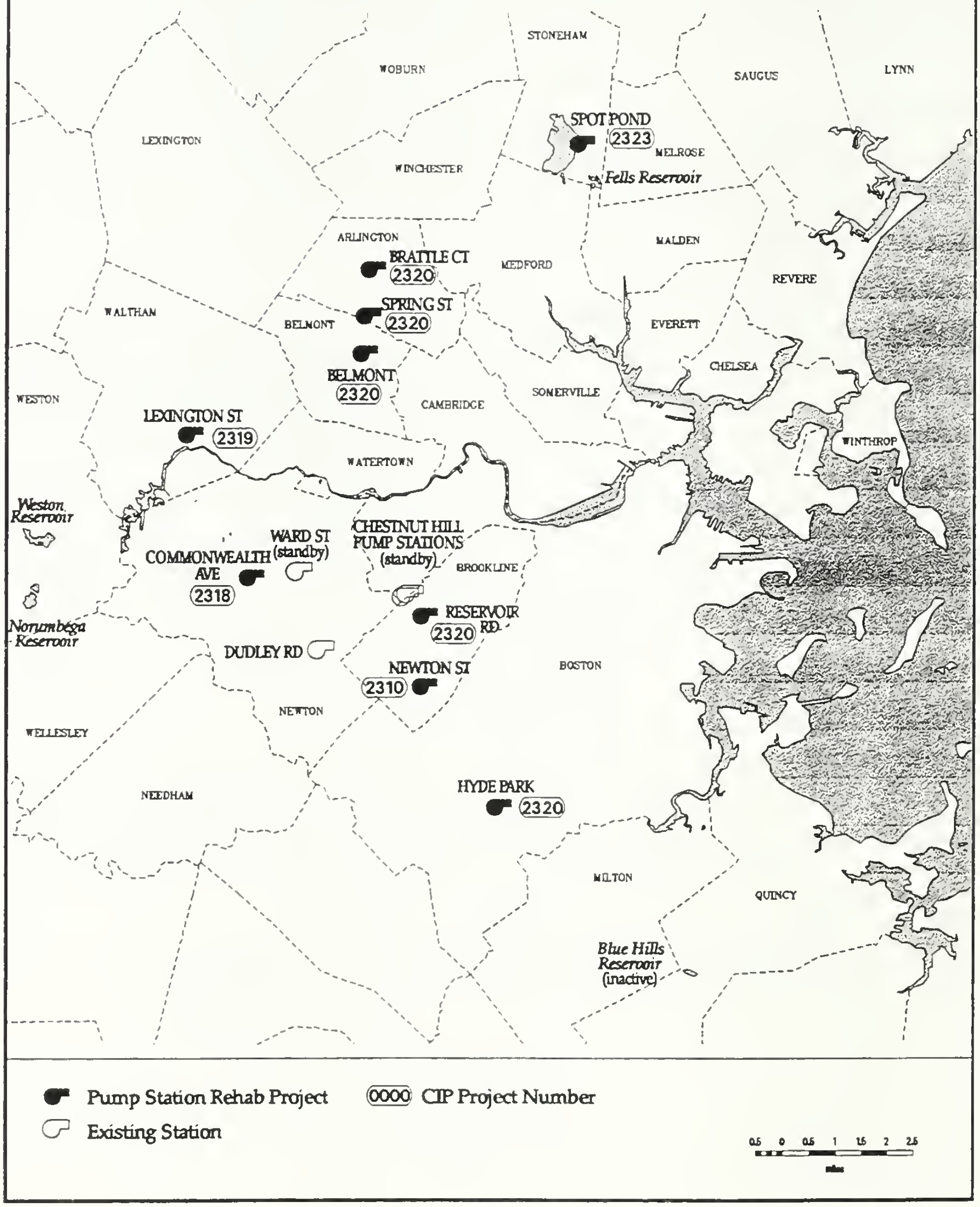
Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB line item	Incremental Cost in FY98	Description
Maintenance	$100,000	Preventive maintenance
Vehicle	$20,000	Crew transportation
TOTAL:	$120,000	

PUMPING STATION PROJECTS AND LOCATIONS



2319. Lexington Street Pump Station Rehabilitation

Purpose

To modernize and improve this 48-year old pump station in Waltham which serves the Northern Extra High System. The station's pumping capacity is inadequate to meet water demands which creates inefficiencies and places stress on other facilities. Improvements will include larger capacity pumping units, backup power generation, and various electrical upgrades.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$582	Feb 88	Oct 97
Land	$6	Jul 94	Sep 95
Construction	$2,756	May 90	Oct 97
TOTAL:	$3,344		

Project History and Background

The Lexington Street Pump Station provides water to the Stearns Hill section of Waltham. The station has a capacity of 2.7 million gallons per day. The average demand of the service area is about 4 mgd, with peak demand of 6.5 mgd. Future demand is projected to be 5 mgd on average and 8 mgd at peak periods by the year 2020.

The present 1.3 mgd average day deficiency is met by a connection to the Northern Extra High Service System. Water must travel from Waltham to a pump station in Arlington in order to be pumped to an elevated tank in Lexington, from which it then flows by gravity to a connection in Waltham. It will be more efficient to simply pump the water at Lexington Street in Waltham.

To meet current and projected demand, the pumping units at Lexington Street will be replaced with two new 5 mgd pumps, and one new 8.5 mgd pump. Related electrical gear and appurtenances will be installed.

To provide facilities for automatic start-up in case of power failure, a generator will be installed. Construction will also include 1,750 linear feet of piping to provide redundant suction and discharge mains for the new pumping units, and isolation valves to protect the station from flooding.

Scope

Phase	Scope
Design/CS/RI	Design, Construction Services, and Resident Inspection of the rehabilitation of the pump station.
Land	Acquisition of the land required to complete the project.
Construction Phase 1	Replace substandard and defective wiring, electrical equipment, and underground storage tanks to provide safety improvements.
Construction MDPW	Install 1,250 feet of a suction main as part of a Massachusetts Department of Public Works urban system project.
Construction Phase 2	Replace the pumping units with two new five mgd pumps, and one 8.5 mgd pump, electrical and mechanical systems; install an emergency generator; complete building and site refurbishing; install 500 linear feet of suction main.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB line item	Incremental cost in FY98	Description
Electricity	($7,200)	Movement of Meter 82 from Northern Extra High Service Area to Lexington.
Maintenance	$20,000	Preventive maintenance.
Total	$12,800	

2320. Rehabilitation of Other Pump Stations

Purpose

To rehabilitate five active pump stations (Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street). Each of these five stations is more than 40 years old, and is overdue for renewal for safety, reliability, and efficiency reasons.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Preliminary Design	$401	Aug 94	Mar 96
Design/CS/RI	$1,555	May 97	Nov 02
Construction	$7,943	Nov 00	Nov 02
TOTAL:	$9,899		

Project History and Background

The MWRA Waterworks distribution system includes ten active pump stations. Design of extensive rehabilitation of the Spot Pond, Newton Street, Lexington Street, and Commonwealth Avenue pump stations is nearing completion. The Dudley Road Pump Station will not be rehabilitated, since the station will be abandoned.

The Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street stations are between 40 and 80 years old and are overdue for major rehabilitations. The Brattle Court Pump Station serves the towns of Arlington, Lexington, Waltham, and Winchester. The Reservoir Road Pump Station serves the town of Brookline. The Hyde Park Pump Station serves Boston, Milton, Norwood, and Canton. The Belmont Pump Station serves Belmont, Arlington, and Watertown. The Spring Street Pump Station serves Lexington, Bedford, part of Waltham, Belmont, Arlington, and Winchester.

Some equipment at each pump station is inoperable, and system demand patterns have shifted during the life of the stations, requiring adjustments to pumping capacity. In addition, station improvements have not kept pace with changes in the current building and safety codes.

Scope

Phase	Scope
Conceptual Design	Planning and conceptual design to inspect and evaluate the HVAC, buildings, pipes, valves, and other systems at the pump stations; determine what work needs to be done, and prepare a conceptual design report. The cost of construction will be estimated upon completion of the conceptual design phase.
Design/CS/RI	Design, Construction Services, and Resident Inspection for the major rehabilitation of the Belmont, Brattle Court, Spring Street, Hyde Park, and Reservoir Road pumping stations. Rehabilitation will include installing new pump units, correcting structural and emergency deficiencies, building system replacement, and building and site refurbishment.
Construction	Construction associated with the rehabilitation of the Belmont, Brattle Court, Spring Street, Hyde Park, and Reservoir Road pumping stations.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2321. Bear Hill Improvements - Section 29 Rehabilitation

Purpose

To improve the condition of this 96-year old pipeline, since its hydraulic capacity has diminished due to build-up of rust and sediment. This pipeline, which serves the Northern Intermediate High System, will be rehabilitated through cleaning and lining.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	In-house	Jan 03	Jan 07
Construction	$1,389	Mar 06	Jan 07
Easements	$14	Jul 05	Jun 06
TOTAL:	$1,403		

Project History and Background

Section 29 is entirely within Stoneham and serves the Northern Intermediate High Service area. This main is 96 years old and measures 6,300 feet in length and 24 inches in diameter. Sections 9 and Section 89 are the only two supply mains to this service area.

Due to its age and the fact that Section 29 is unlined, sediment build-up has reduced the pipeline carrying capacity to approximately 45 percent of the original design capacity (C-value: 58). In the event of a shut down in Section 89, Section 29 would not be able to meet the minimum hydraulic needs of the area. The sediment build-up may also require additional chlorination to maintain water and to contribute to solving taste and odor problems.

Scope

Phase	Scope
Design/CS/RI	Design, Construction Services, and Resident Inspection of the rehabilitation of Section 29. Exploratory excavation and corrosion analysis will be performed to evaluate the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion.
Construction	Rehabilitation of 6,300 linear feet of 24-inch pipe on Section 29. Rehabilitation consists primarily of cleaning and cement mortar lining of the interior pipeline walls, as well as replacement of all mainline valves, blow-off valves, and appurtenances.
Easements	Negotiate easements along the pipeline construction section.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2323. Spot Pond Pump Station Rehabilitation

Purpose

To improve and modernize pumping facilities and equipment at the over 90-year old Spot Pond Pump Station. These improvements will directly benefit the Northern High and Northern Intermediate High systems, and will improve system-wide emergency response capabilities. Project components include rehabilitation of the pump station, installation of a new suction line, rehabilitation of discharge lines, construction of a sanitary sewer, and remediation of a contaminated land site.

Expenditure Forecast and Schedule

Phase	**Total Contract Amount ($000)**	**Begin date**	**End date**
Pump Station Rehabilitation:			
Design/CS/RI	$2,150	Feb 88	Oct 97
Construction	$12,219	May 84	Oct 97
Suction Pipeline:			
Study	$476	Nov 89	Nov 90
Design/CS/RI	$1,388	Jul 90	Apr 98
Construction	$10,710	Oct 95	Apr 98
Hazardous Materials Remediation:			
Environmental Assessment & Remediation Plan	$350	Oct 94	Aug 98
Remedial Action Plan	$1,674	Oct 98	Jul 98
Oil Control Plan	$171	Aug 92	Dec 92
Drain Line Cleaning	$268	Nov 92	Jan 93
DEP Review Fees	$10	Jul 94	Apr 99
Discharge Pipelines:			
Design/CA/RI-Rehab Discharge	In-house	Jul 95	Dec 00
Construction-Rehab Discharge	$1,530	Sep 99	Dec 00

Sewer:			
Construction-Sewer	$205	May 96	Dec 96
Spot Pond Construction Field Office			
Design/CA/RI	$200	Jul 97	Oct 00
Construction	$1,021	Oct 99	Oct 00
Technical Assistance	$141	May 84	Dec 00
Paving-Highland Avenue	$86	Oct 94	Nov 94
Hydraulic Transient Analysis	$61	Apr 95	Sep 95
Construction Tudor Barn	$125	Mar 97	Jul 97
TOTAL:	$32,785		

Project History and Background

The pump station at Spot Pond chlorinates and pumps water from the pond to the Northern Intermediate High Service Area (Bear Hill Reservoir) and the Northern High Service Distribution System (Fells Reservoir). The station was built in 1905. Due to the age, condition, and critical need of the facility, the rehabilitation of the pump station is a top priority of the Waterworks Division.

A new 14,500 - foot, 60- to 72-inch diameter suction pipeline will be installed from the City Tunnel Shaft in Malden to Spot Pond Pump Station. This will provide the station with water at a pressure head greater than the pond, significantly reducing the pumping requirement, and eliminating the need to take water from an uncovered water source, which will meet the requirements of the Safe Drinking Water Act.

The pipeline will improve the reliability of the system by providing increased capacity to transfer water between the low and high service systems during emergencies and facilitate future use of the Fells Reservoir as the main distribution reservoir for the Northern High Service System.

To provide adequate discharge capability, rehabilitation of 9,000 feet of Sections 13 and 64 is included. These 36-inch diameter mains extend from the pump station to the Fells Reservoir, and deliver water to Melrose and Stoneham. Because the structural integrity of these pipelines has been determined to be sound, rehabilitation rather than replacement is now planned. This will improve carrying capacity, reduce friction and turbulence, and reduce the risk of water quality impairment.

This project also includes a major improvement to the layout of valves between the pump station and Fells Reservoir.

A 1,500-foot sanitary sewer will also be constructed to replace an existing septic system that serves the pump station and the adjacent Botume house. Seepage from both facilities will be pumped by a small ejector station to an existing MDC sewer on Pond Street in Stoneham.

During design of the pump station rehabilitation, several environmental problems were discovered including contamination of on-site soil, groundwater, and the adjacent brook. Additional contamination may be encountered during construction. Under emergency order the MWRA and the Department of Environmental Protection (DEP) are working together to eliminate the sources of contamination at the pump station. Once this emergency work is completed, the MWRA will begin the cleanup process at the site, as required by DEP.

The Spot Pond Pump Station Project also involves the evaluation of the environmental conditions of the site and the nearby Spot Pond Brook area and the preparation and implementation of a remedial cleanup plan. This portion of the project is comprised of three phases and will follow the Massachusetts Contingency Plan as specified by DEP. The first phase (study) consists of an environmental assessment to determine the type and extent of contamination. The second phase (Feasibility Study/Remedial Response Plan) includes a risk assessment to determine the level of risk to the environment and to the public, and the development of a plan of necessary corrective actions. The third phase (Implementation of Remedial Response Plan) consists of performing the restorative work specified in the remedial plan

Scope

Phase	**Scope**
Pump	Upgrade of pump for the purpose of pumping to the Bear Hill covered reservoir.
Electrical Upgrade	Electrical system upgraded to provide power for the 300 HP and 500 HP motors added for pumping to Bear Hill Reservoir. Includes site preparation, masonry work, and new conduits and control panels.
Design-Diesel Exhaust	Design for the replacement of the exhaust systems on existing diesel pumps.
Construction - Diesel Exhaust	Replacement of the exhaust systems on existing diesel pumps.

Design/CS/RI-Pump Station	Design, construction services, and resident inspection for major rehabilitation of the pump station including all new pump units, emergency generators, building systems replacement, and building and site refurbishment.
Construction Phase 1	Construction of immediate rehabilitation of the pump station building which includes space for a new control facility. Refurbish five existing pumps, three diesel engines, and other ancillary equipment so that operations can continue until new equipment is installed.
Construction Phase 2	Installation of eight new pump units, two emergency generators, replacement of all mechanical and electrical systems, and complete building and site refurbishment.
Spot Pond Pump Station Engine 29	New electric drive for Pump # 29 to improve the station's reliability during the renovation period. A 24-inch check valve will be removed from the discharge line and replace a pipe spool piece.
Oil Control Plan	Development and implementation of an oil control plan to eliminate the sources of contamination in the floor drainage.
Drain Line Cleaning	Cleaning of floor drains to eliminate oil contamination drainage into Spot Pond.
Des/CS/RI-Suction Pipe	Design, construction services, and resident inspection of a new 14,500 linear foot, 60- to 72-inch diameter suction pipeline.
Study - Suction Pipe	Study to determine the best method to reduce high water service to the low service gradient of Spot Pond.
Construction-Suction Pipe	Construction of a 14,500 linear foot, 60- to 72-inch diameter suction pipeline to pump water from the gradeline of the City Tunnel rather than that of the low service system to the Northern High Service System.
Hydraulic Transient Analysis	Sizing locating air release and vacuum valves at points along distribution lines 13 and 29 will relieve potentially damaging pressures occuring during winter hammer.
Paving-Highland Ave	Full width overlay of Highland Avenue in Malden from Elm Street to Fells Way.
Design-Rehabilitation Discharge	Design for the rehabilitation of 9,000 linear feet of the 36-inch mains for Sections 13 and 64.
Construction-Rehabilitation Discharge	Rehabilitation of 9,000 linear feet of the 36-inch main for Sections 13 and 64.
Design-Sewer	Design of a 1,500 linear foot sanitary sewer which will be constructed to facilitate abandonment of the existing septic system that serves the pump station and adjacent construction field offices.

Construction - Sewer	Construction of the sanitary sewer in order to conform with DEP requirements.
Design/CA/RI Spot Pond Construction Field Office	Design, construction administration, and resident inspection of the space currently housing the pumps, which will become vacant once the rehabilitation of the pump station is complete. This space will be used by the construction staff that are currently housed in the leased property at Roland Street in Charlestown, which expires January 31, 2001.
Construction Spot Pond Construction Field Office	Construction for the conversion of the space that formerly housed the pumps, into office space for the construction staff.
Construction Tudor Barn	Stabilization/reconstruction of this historic barn that sits on the land around Spot Pond. This is required under the terms of the Memorandum of Agreement with the Metropolitan District Commission and the Massachusetts Historical Commission.
Technical Assistance	Technical assistance in the design and construction of the pump station, suction pipeline, discharge pipeline, and covered storage, for development of the remedial response plan.
Environmental Assessment & Remediation Plan	Determine the nature and extent of contamination of at the pump station and area, conduct a risk assessment to determine the level of risk to the environment and to the public, and develop a remedial action plan.
Remedial Action Plan	Monitor restorative work specified in the remedial action plan.
DEP Review Fee	Fee paid to the Department of Environmental Protection for review of corrective measures for Spot Pond to eliminate the sources of contamination at the site.

Changes in Scope Since FY97-99 CIP

Phase	**Change**
Design/CA/RI Spot Pond Construction Field Office	New phase.
Construction Spot Pond Construction Field Office	New phase.
Construction Tudor Barn	New phase.

Design/CS/RI Fells Reservoir	Moved to its own project under the Drinking Water Quality Improvements category.
Construction Fells Reservoir	Moved to its own project under the Drinking Water Quality Improvements category.
DEP Permit Fees	Moved to its own project under the Drinking Water Quality Improvements category.

CEB Impact

CEB Line Item	Incremental Cost in FY98	Incremental Cost in FY99	Description
Electricity		($117,050)	Decrease of 45% in power consumption by raising suction pipe 80 feet.
Vehicles	$13,000		Crew Transportation
Total	$13,000	($117,050)	

2324. Weston Aqueduct Supply Main 4 (WASM 4)

Purpose

To improve the condition and carrying capacity of this major supply line presently serving the Northern High and Low Service systems. This 64-year old mostly steel main is unlined, has low C-values, and experiences leaks at an above average rate. Rehabilitation by replacement, sliplining, cleaning and lining and valve replacement will address these factors and also provide flexibility to convert this line from high service to low service as may be needed.

Expenditure Forecast and Schedule

Phase	Total Contract Amount $(000)	Begin date	End date
Design/CA/RI	$5,196	Mar 95	Jan 04
Construction	$32,629	Apr 95	Jan 04
Appraisal/Easements	$133	Mar 95	Feb 01
Technical Assistance	$103	Mar 95	Jan 04
TOTAL:	$38,061		

Project History and Background

The Weston Aqueduct Supply Main (WASM 4) is a 64-year old, predominantly 60-inch diameter pipeline consisting primarily of unlined steel with some prestressed concrete cylinder and cast iron pipe sections. It extends 47,000 linear feet from Weston through Newton, Watertown, and Boston into Cambridge.

WASM 4 was originally part of the Low Service System and conveyed water from the Weston Aqueduct to the Spot Pond supply mains. Upon completion of the Hultman Aqueduct, and its interconnection to the Weston Aqueduct Terminal Chamber in 1941, and the addition of Newton to our member communities in the early 1950s, the western portion of WASM 4 was transferred to the high service system as a temporary means of conveying water from the Hultman to a portion of Newton and Watertown while still maintaining supply to the Spot Pond supply mains at its east end through pressure reducing valves.

In recent years, the middle portion of WASM 4 along Nonantum Road has been shut down due to an excessive leakage rate. The western portion is currently being used to supply about three mgd to portions of Newton and Watertown

(Meters 103, 104, and 105). The eastern portion is currently being used to transfer water from the City Tunnel Extension via Shaft 8 pressure reducing valves to the Spot Pond supply mains.

WASM 4, when rehabilitated, will be able to operate as it currently does, as a high service main from the Hultman Aqueduct Branch up to the Pressure Reducing Valve Structure at Nonantum Road, continuing as a low service main to its connections with the East and West Spot Pond Supply Mains. WASM 4 will also have the capability to operate completely as a low service main. This flexibility in operating conditions will allow WASM 4 to best support the system. When in the split high/low mode, WASM 4 can support WASM 3 through the planned connecting mains during planned shutdowns or emergencies; this support has significantly reduced the cost of the Connecting Mains - Shaft 7 to WASM 3 project (project #2329).

However, the present hydraulic characteristics of WASM 4 do not have sufficient capacity to satisfy a peak flow of approximately 40 mgd, and during the past 30 years the pipeline has experienced 84 reported breaks; 60 percent of those breaks have occurred during the last ten years.

In order to remove WASM 4 from service to allow it to be rehabilitated, alternative supplies must be provided for Watertown Meter 103 and Newton Meters 104 and 105. Meter 103 is being upgraded and local water main improvements are being built along Galen Street in Watertown. These efforts, when completed, will allow the other Watertown meters to temporarily supply the area normally served by Meter 103. These improvements are being constructed under a contract by Mass Highway. Alternative sources for the Newton northern pressure district, normally supplied by meters 104 and 105, have been constructed and are now being tested. Two pressure reducing valves were installed that will allow the southern pressure district that is supplied by the Commonwealth Ave Pumping Station, to temporarily serve the northern pressure district.

Scope

Phase	Scope
Design/CA/RI	Design, construction administration, and resident inspection for the rehabilitation of Sections 1W, 13W, 14W, 15W and portions of 2W and 5W.
Appraisal/ Easement	Negotiate easements along the construction route.

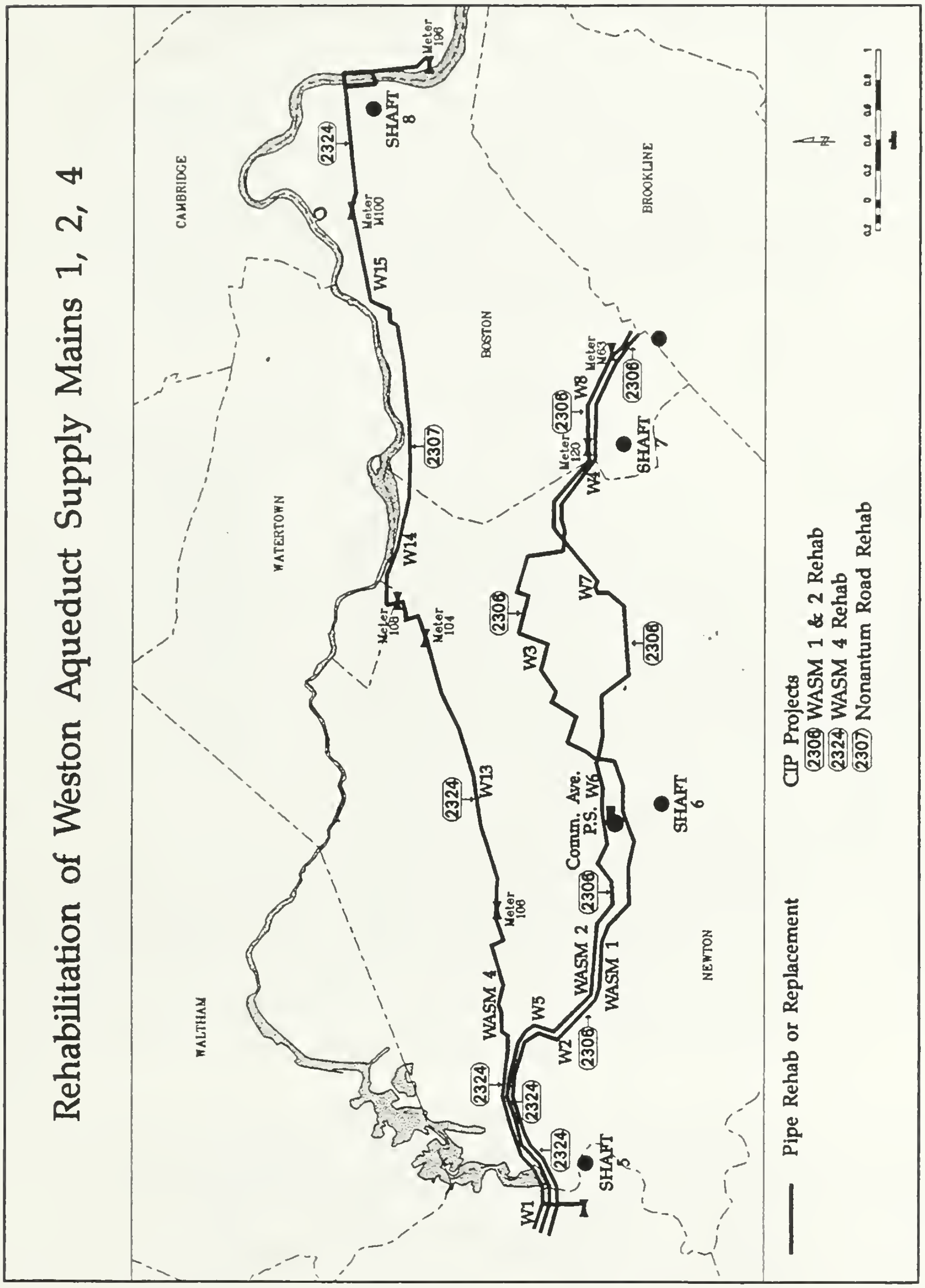
Construction-WATC & Master Meters - CP1	Cleaning and cement lining of 1,700 linear feet of three parallel 60-inch mains of Section 1.
Construction Commonwealth Ave - CP2	Cleaning and lining of 5,100 linear feet of 48-inch and 10,200 linear feet of 60-inch diameter mains of WASMs 1, 2, and 4 within Commonwealth Avenue in Newton, as well as replacement of existing line valves, air/vacuum valves, and blow-off valves.
Construction - Rowe St & Nonantum Rd-CP3	Cleaning and cement lining of 22,300 linear feet of 60-inch pipe on Sections 13 and 14.
Construction-Section 15 (Brighton) - CP4	Sliplining with some limited pipe replacement and cement lining of 10,486 linear feet of 60-inch and 1,008 linear feet of 42-inch mains of Section 15. Cleaning and lining 808 linear feet of 30-inch pipe which crosses the Western Avenue Bridge. Also, the replacement of Master Meter 100 will be included in this contract.
Construction-Galen St Meter 103	Payment to the Massachusetts Highway Department for installation of a new meter, check valve, vault and appurtenances for the rehabilitation of Meter 103.
Construction-MDC Bridge Crossing	Replacement of the two, 387 linear foot 30-inch steel mains within the River Street bridge.
Design 2	Design of the rehabilitation of two community pipelines, and two new pressure reducing valves and meter upgrade installations in Newton.
Construction-Newton Water Mains	Rehabilitation consists of cleaning and lining of 8,700 linear feet of 12-inch diameter community pipeline, as well as installation of two new pressure reducing valves and upgrades at Meter 105.
Technical Assistance	Provide technical assistance for the Construction 1 and Newton Water Main phases.

Changes in Scope Since FY97-99 CIP

Phase	**Change**
Construction WATC & Master Meters - CP1	Changed 6,233 linear feet of 60-inch mains to 5,800 linear feet of three parallel 60-inch mains. Moved 4,100 linear feet and four master meters to Metro West Water Supply Tunnel - Construction Package 8.
Construction Commonwealth Ave - CP2	Changed 5,200 linear feet of 48-inch to 5,100 linear feet of 48-inch, and changed 10,400 linear feet of 60-inch to 10,200 linear feet of 60-inch.

Construction Rowe St & Nonantum Rd - CP3	Changed 20,877 linear feet of 60-inch pipe to 22,300 linear feet of 60-inch pipe.
Construction Section 15 (Brighton) - CP4	Changed 10,538 linear feet of 60-inch pipe to 10,486, and added 808 linear feet of cleaning and lining a 30-inch pipe on the Western Ave bridge.
Construction MDC Bridge Crossing	Changed 791 linear foot 30-inch steel mains to 387 linear foot 30-inch steel mains.

CEB Impact None.



Rehabilitation of Weston Aqueduct Supply Mains 1, 2, 4

2325. Spot Pond Supply Mains - Rehabilitation

Purpose

To improve the condition, carrying capacity, and valve operability of the two long supply mains which extend north from Chestnut Hill to Spot Pond. These cast-iron mains, which are nearly 100 years old, deliver water to the Northern Low Service System. Improvements will involve a combination of replacement, cleaning and lining, and valve repair, depending on specific site conditions and needs. By improving these supply lines, the need to take water from the City Tunnel to augment the low service system will be reduced.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Prelim Design & Design/CA/RI	$8,976	Jul 97	Dec 08
Construction	$43,047	May 04	Dec 08
Easements	$203	Jul 03	Jun 04
TOTAL:	$52,226		

Project History and Background

The Spot Pond Supply Mains serve the Northern Low Service Area, including portions of Boston, Arlington, Chelsea, Malden, Medford, Somerville, and Everett. The lines are designed to fully supply Cambridge during drought or emergency. The East Spot Pond Main consists of 60,500 linear feet of mostly 48- to 64-inch diameter pipeline which passes through Brookline, Boston, Cambridge, Somerville, Medford, Malden, Melrose, and Stoneham.

The West Spot Pond Main consists of 54,000 linear feet of mostly 48-inch diameter pipeline with short segments of 60- and 102-inch diameter pipeline which passes through Brookline, Boston, Cambridge, Somerville, Medford, and Stoneham. The carrying capacity of the 90-year old mains is reduced to approximately 50 percent of the original design capacity (C-Value: 67) due to a build up of rust deposits (tubercules) and other matter along the pipeline walls.

Many of the valves on the pipeline are inoperable, and all are beyond their useful lives. Inoperable valves reduce operational flexibility, and the ability to respond to emergencies requiring isolation or re-routing. Restoration of design capacity of these mains is required once Spot Pond Reservoir is taken off line.

The planned reconfiguration of the water distribution system assumes that the Spot Pond Supply Mains will feed from the City Tunnel, only during periods of peak demand, and most of the supply to there will be from the Weston Aqueduct Supply Main 4 (WASM 4), which will be connected to the covered storage facility (Weston Tank), to be constructed near the current location of the Weston Reservoir (project #2201, MetroWest Tunnel.) The changed configuration will allow the unification of the Northern Low and Boston Low Service Areas into one service area, and will improve pressures to the far reaches of the Northern High Service Area, since the City Tunnel will no longer normally supply the demands of the Northern Low Service Area.

Scope

Phase	Scope
Preliminary Design and Design/CA/RI	Preliminary Design, Design, Construction Administration, and Resident Inspection of rehabilitation/replacement of Sections 3, 4, 5, 6, 7, 9, 10, 11, 12, 67 and a portion of Section 2.
Construction	Construction of the rehabilitation/replacement of 1,142 linear feet of 64-inch pipe on Sections 3; 18,945 linear feet of 48-inch pipe on Section 4; 2,918 linear feet of 48-inch pipe on Section 5/5A; 10,494 linear feet of 48-inch pipe and 258 linear feet of 60-inch pipe on Section 6/6A; 13,897 linear feet of 48-inch pipe on Section 7; 8,225 linear feet of 48-inch pipe on Section 9; 363 linear feet of 48-inch pipe, 409 linear feet of 36-inch pipe, and 501 linear feet of 30-inch pipe on Section 10; 15,817 linear feet of 48-inch pipe on Section 11; 10,550 linear feet of 48-inch pipe on Section 12; 6,950 linear feet of 48-inch pipe on Section 67; and 1,000 linear feet of 48-inch pipe on a portion of Section 2.
Easements	Easements along the construction route.

Changes in Scope Since FY97-99 CIP

Phase	Change
Preliminary Design and Design/CA/RI	Changed the name of Preliminary Study to Preliminary Design and combined with the Design/CA/RI phase. Also adjusted and expanded the scope (see below for details).

Construction	Changed 45,200 linear feet of 48-inch pipe (Sections 2, 4, 6, and 7) to 44,336 linear feet of 48-inch pipe. Also changed 35,500 linear feet of 48-inch pipe (Sections 9, 11, and 12) to 34,592 linear feet of 48-inch pipe. Added rehabilitation of 1,142 linear feet of 64-inch pipe (Section 3); 2,918 linear feet of 48-inch pipe (Section 5); 363 linear feet of 48-inch pipe, 409 linear feet of 36-inch pipe, and 501 linear feet of 30-inch pipe (Section 10); 6,950 linear feet of 48-inch pipe (Section 67), 258 linear feet of 60-inch pipe (section 6); and 6,248 linear feet of 60-inch pipe (section).
Easements	Changed phase name from land to easements.
Equipment Purchase	Deleted this phase since it was no longer needed.

CEB Impact None.

2326. Northern Low Service Pipeline Replacement

Purpose

To repair segments of the Northern Low Service System that experience excessive leakage and require frequent maintenance. One segment is near Medford Square. Rehabilitation will involve pipe replacement and valve and meter improvements.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$480	Aug 88	Apr 04
Construction	$1,343	Apr 03	Apr 04
Easements	$4	Jul 02	Jun 03
TOTAL:	$1,827		

Project History and Background

The Medford section (Section 16W) of the Northern Low Service Pipeline is in need of repair. The pipeline currently is part of the feed pipeline for Spot Pond in Stoneham. This pipeline was built in the 1930s and suffers from corrosion due to electrolysis and corrosive soils from the tidal flats of the Mystic River. The corrosion levels have led to excessive leaks, resulting in high maintenance costs. Design was started in 1989, however due to project scope changes, the final design will be re-procured in 1997.

Scope

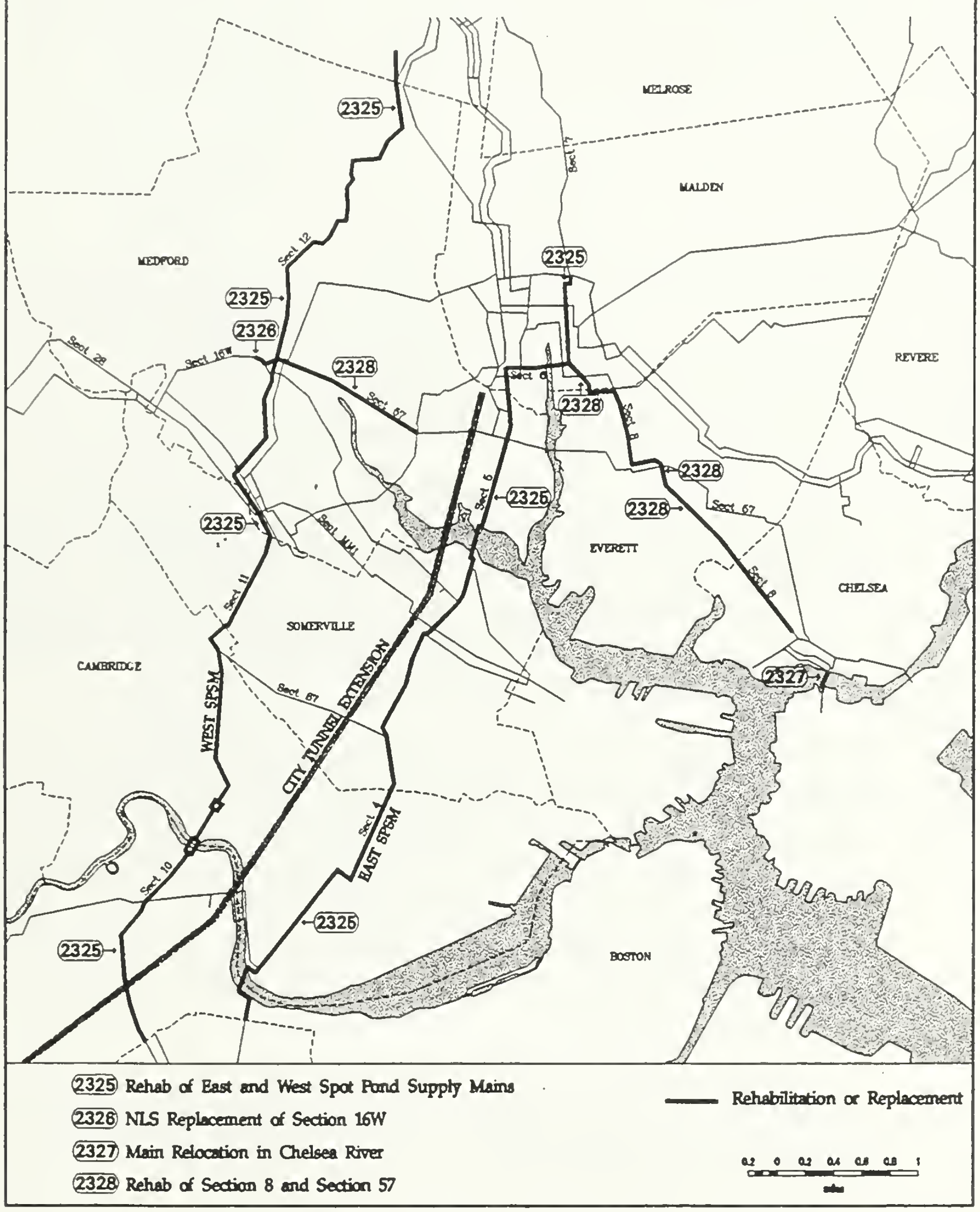
Phase	Scope
Design/CS/RI-Medford 16W	Design, construction service, and resident inspection for the rehabilitation and/or replacement of Section 16W, two pressure reducing valves, and vaults; replacement of interconnecting piping and two meters at High Street in Medford.

Construction-Medford 16W	Construction consists of: rehabilitation and/or replacement of approximately 1,100 linear feet of 60-inch pipe near Medford Square; rehabilitation of two pressure reducing valves and vaults; replacement of interconnecting piping and two meters at High Street in Medford.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

NORTHERN LOW SERVICE PIPELINE PROJECTS



2327. Water Main Relocation in Chelsea River

Purpose

To relocate the Section 8 water main which crosses the Chelsea River due to a planned dredging operation by the U.S. Army Corps of Engineers and the Massachusetts Port Authority (Massport). A new pipeline will be installed at a lower depth to maintain service for Logan Airport and East Boston.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Design/CA/RI	$730	Dec 96	Nov 01
Construction	$4,322	Mar 01	Nov 01
TOTAL:	$5,052		

Project History and Background

Section 8, and two parallel segments of Section 38, of which one is active, traverse the portion of the Boston Harbor known as the Chelsea River and provide nearly all the water for East Boston and Logan Airport. The inactive segment of Section 38, which lies parallel to the active portion of Section 38, can still function as a back-up to contribute a very limited flow to these areas during preventive maintenance.

The U.S. Army Corps of Engineers has notified the MWRA of its intent to deepen and widen the Chelsea River channel to improve ocean access for large fuel tankers. This work is expected to take place within three years and will result in a depth in the river of approximately 38 feet below the mean low water (MLW) level. The top of Section 8 is approximately 39 feet below MLW. This pipeline, which is in the over-dredging zone, will have to be relocated if the project proceeds. The two Section 38 pipelines are approximately 43 feet and 35 feet below MLW.

The older, inactive Section 38 pipeline will be removed and not replaced. The newer, active Section 38 pipeline, whose top is at approximately 43 feet below MLW, will not be disturbed.

Under federal statutes governing navigable waterways, the federal government has the preeminent right to carry out improvements and operations without compensation to local utilities for damages which may occur as a consequence. Therefore, the MWRA is responsible for relocating the affected pipelines prior to the dredging operations of the Corps. The recently authorized 1996 Seaport Bond Bill mandates Massport to fund the Section 8 relocation project.

Because there is no storage in this portion of the distribution system, two active pipelines are required at all times to meet the needs of East Boston and Logan Airport. Therefore, it is essential that one new pipeline be constructed due to the dredging (Section 8). Without an adequate backup pipeline, any shutdown along one of the two active lines due to maintenance activities or a water main break would severely disrupt flows to Logan Airport.

Scope

Phase	Scope
Planning/ Design/CA/RI	Planning, design, construction administration, and resident inspection for the relocation of Section 8.
Construction	Construction of approximately 950 linear feet of 48-inch diameter pipeline for Section 8, at a level below the mean low water line of 40 feet.

Changes in Scope Since FY97-99 CIP

Phase	Change
Planning/Design/ CA/RI & Construction	Removed work associated with the second crossing (Section 38).

CEB Impact

None.

2328. Northern Low Service Rehabilitation Sections 8 and 57

Purpose

To improve the condition and reliability of two unlined pipe segments serving a portion of the Northern Low System. These pipes, Sections 8 and 57, have reduced carrying capacities due to rust build-ups, and have experienced leaks at above average rates. Improvements will consist primarily of replacement of a portion of Section 8 and, cleaning, lining, and valve repairs along nearly three miles of water main.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	In-house	Nov 99	Mar 07
Construction	$10,580	Jul 03	Mar 07
Easements	$69	Jul 02	Jun 05
TOTAL:	$10,649		

Project History and Background

Section 8 was installed between 1897 and 1913 and serves Malden, Everett, Chelsea, and East Boston. Section 57 was installed in 1938 and serves Malden, Medford, Everett, Chelsea, and East Boston.

The Section 8 pipeline is currently functioning at approximately 45 percent of its original carrying capacity (C-Value: 60) due to the build up of rust deposits and other matter along the pipeline walls. The Section 57 pipeline has experienced five leaks during the last three years. This main is currently functioning at approximately 60 percent of its original carrying capacity (C-Value: 85) due to the build up of rust deposits and other matter along the pipeline walls.

Scope

Phase	Scope
Design: Section 8	Design for the rehabilitation and replacement of Section 8. Test pit excavation and corrosion analysis performed during the preliminary design phase will evaluate the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion. The results of these analyses will indicate the amount of pipeline which will have to be replaced.
Easements: Section 8	Easements along the pipeline construction route.
Construction: Section 8	Construction will consist of cleaning and cement mortar lining of the pipeline interior, replacement of all defective and inoperable valves, and the strategic addition of new valves for 7,500 linear feet of 48-inch pipe on Section 8 in Malden and Everett. Replacement consists of 9,722 feet of obsolete 42-inch pipeline with new 36-inch ductile iron main and replacement of all necessary valves and blow off connections from Second Street in Everett to the Mystic River Bridge in Chelsea.
Design: Section 57	Design for the rehabilitation of Section 57. Test pit excavation and corrosion analysis performed during the preliminary design phase will evaluate the structural integrity of the pipe, the condition of bedding material, and the extent of pipe corrosion. The results of these analyses will indicate the amount of pipeline which will have to be replaced.
Easements: Section 57	Easements along the pipeline construction route.
Construction: Section 57	Rehabilitation will consist of cleaning and cement mortar lining of the pipeline interior, replacement of all defective and inoperable valves, and the strategic addition of new valves for 8,120 linear feet of 48-inch pipe on Section 57 in Medford.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

None.

2329. New Connecting Mains - Shaft 7 to WASM 3

Purpose

To provide redundancy and improve reliability of WASM 3, and to facilitate the future rehabilitation of WASM 3; hydraulic looping and redundancy, and to facilitate rehabilitation of the High Service dead end Sections 23/24, 47 and the Watertown Branch; to enable the Intermediate High Sections 59 and 60 to be taken off-line for rehabilitation; and to improve water quality by reducing the length of unlined cast iron water mains in the Authority's system. In meeting the project goals, the basis for a strong hydraulic network of piping between WASM 3, WASM 4, the City Tunnel, and the future Metropolitan Tunnel Loop will be provided. The future conversion of Sections 23/24 to the Intermediate High Service to create a unified Intermediate High Service area connecting the Belmont and Commonwealth Avenue Pumping Stations will be possible. This project will involve installation of 31,415 linear feet of new pipeline, and rehabilitation of 62,910 linear feet of pipeline.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Routing Study	$408	Aug 94	Nov 96
Design/CA/RI	$7,709	Dec 97	Jan 07
Construction	$39,310	Jul 96	Jan 07
Easements	$248	Jul 02	Jan 04
TOTAL:	$47,675		

Project History and Background

The Weston Aqueduct Supply Main 3 (WASM 3) is a 56- to 60-inch diameter steel main installed in 1926. Upon completion of the Hultman Aqueduct, and its interconnection to the Weston Aqueduct Terminal Chamber in 1941, WASM 3 was transferred to the high service system. WASM 3 is connected to the Hultman Aqueduct at one end and the City Tunnel at its other end. WASM 3, together with connecting piping, extends from Weston near Shaft 5 to Somerville at Shaft 9. Most of the flow comes from Shaft 5, with peak flows of 57 mgd. A lesser amount enters the main from Shaft 9. There are no connecting mains along the length of this 11-mile pipeline, and no other means available to adequately supply the nine communities served by this line.

WASM 3 provides service to the communities northwest of Boston and is the sole source of supply to the Northern Extra High Service Area (Bedford, Lexington, Waltham, Arlington, and Winchester) and the Intermediate High Service Area (Belmont, Arlington, and Watertown). It also supplies a portion of the Northern High Service Area (Waltham, Watertown, Belmont, Arlington, Medford, and Somerville), and is a means of supplying the Spot Pond Reservoir. The population served by WASM 3 is about 190,000.

A break almost anywhere on this pipeline would result in severe service disruptions in Waltham, Watertown, Arlington, Lexington, Bedford, Winchester, and Belmont. Virtually no water would reach Waltham if a break were to occur at the southern end of the pipeline; water normally supplied through the Shaft 5 connection would be forced through the Shaft 9 connection, increasing flows and reducing hydraulic grade lines in both WASM 3 and the City Tunnel. The lack of redundancy also makes routine cleaning and lining of the 70-year old pipeline impossible. The need for maintenance is indicated by the reduced carrying capacity of the line. The actual carrying capacity of WASM 3 is approximately 65 percent of design capacity (C-Value: 90).

This project has been configured to convey high service water from WASM 4 to WASM 3 and to improve the capability to convey water from Shaft 9 of the City Tunnel to WASM 3. This will be accomplished by rehabilitating or replacing existing dead-end mains from the City Tunnel or from WASM 3, and connecting these mains by constructing new pipelines, such that transmission loops will be formed between the City Tunnel and WASM 3. A goal of this project is to make it possible to rehabilitate the Intermediate High System; the new pipelines built to loop the high system could temporarily be used as intermediate high mains allowing for rehabilitation/replacement of Sections 25, 59, and 60. The rehabilitation of WASM 4 (project #2324) is also closely related to this project, because WASM 4 will be interconnected to the new connecting mains of the Shaft 7 to WASM 3 project. WASM 4, which can be operated on high or low service, runs from Shaft 5 to Shaft 8, midway between the City Tunnel and WASM 3. Using WASM 4 as a supply means for the new connecting mains has resulted in cost savings by delaying/eliminating the proposed new pipeline south of WASM 4 to a Shaft 7 connection. This project has evolved from the "Shaft 7 to WASM 3" connecting mains to the WASMs 3 and 4 connecting mains.

Scope

Phase	Scope
Routing Study	Identification of alternatives to determine the optimum approach for providing additional strong connection(s) to WASM 3.

Design/CA/RI	Design, Construction Administration, and Resident Inspection of the north, south, northeast, west, and intermediate high segments of the new connecting mains of Shaft 7 to WASM 3.
Construction	**North Segment**: Installation of 19,020 linear feet of new 48-inch connecting main from WASM 4 to WASM 3. **South Segment**: Installation of 345 linear feet of 24-inch pipe from Shaft 7 to Section 47. Clean and line 8,290 linear feet of 20-inch pipe (Section 47) from Meter 120 to WASM 4 and 14,900 linear feet of 36-inch (Section 23) and 20-inch (Section 24 and 47 remaining portion) pipe. **West Segment**: Installation of 12,050 linear feet of 36-inch watermain from Section 24 at the Charles River to the Watertown Section, including a 16-inch connection to the new Newton meter. Cleaning and lining of 350 linear feet of 20-inch pipe along Section 24 from WASM 4 to the north side of the Charles River and 5,770 linear feet of 30-inch pipe along the Watertown Section along with the replacement of a 30-inch valve at WASM 3. **Northeast Segment**: Clean and lining of 17,200 linear feet of Sections 18 (16 to 20-inch), 50 (20-inch), and 51 (48-inch).
Easements	Easements along the construction routes for the north, south, west, and northeast segments.
Construction Intermediate	Cleaning and lining of 16,400 linear feet of 20-inch pipe on Sections 59 and 60 between Meter 2 and Meter 121.
Easements Intermediate	Easements along the construction route for the Intermediate segment.
Construction Watertown Main	Payment to the City of Watertown to reimburse them for their project that will replace our existing pipeline.

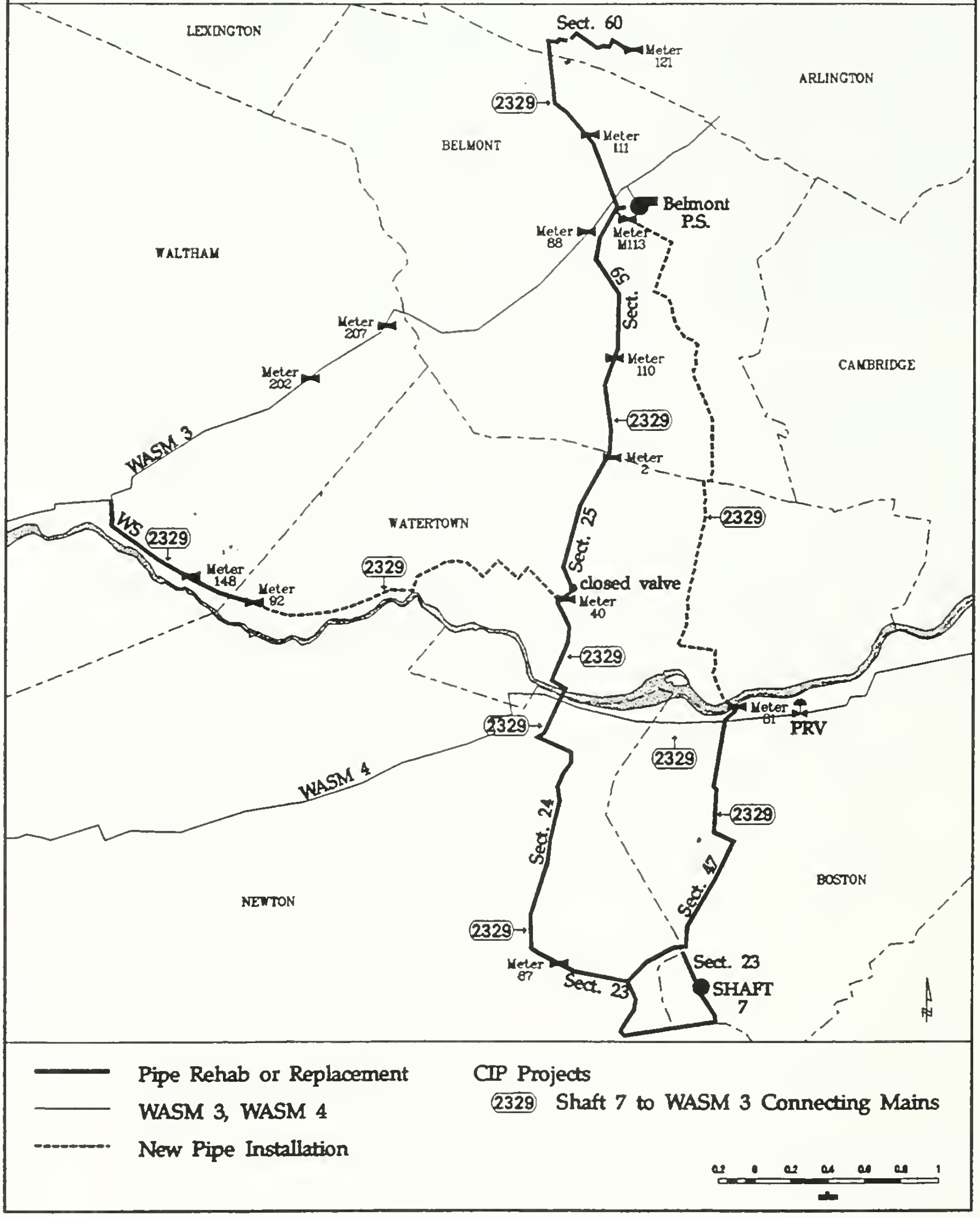
Changes in Scope Since FY97-99 CIP

Phase	**Change**
Design/CA/RI & Construction	**North Segment:** Reduced length by 480 linear feet. **South Segment:** Added 345 linear feet of new 24-inch pipe and reduced the total length of cleaning and lining by 2,040 linear feet for Sections 23, 24, and 47.

	West Segment: Increased the new 36-inch pipe by 550 linear feet, deleted 1,700 linear feet of new 16-inch pipe, and added cleaning and lining of 350 linear feet of 20-inch pipe. **Northeast Segment:** Deleted 6,00 liner feet of new 24-inch pipe. Added cleaning and lining of 17,200 linear feet of pipe on Sections 18 (16 to 20-inch), 50 (20-inch), and 51 (48-inch).
Construction Intermediate	Increased cleaning and lining of Sections 59 and 60 by 400 linear feet. Deleted 4,900 linear feet of new 20-inch pipe on Section 25.

CEB Impact None.

Connecting Mains from Shaft 7 to WASM 3



2331. Northern High Service - Replacement of Section 26

Purpose

To replace a 98-year old section of small diameter pipe to ensure reliable and adequate service to Saugus and surrounding areas. The existing main is in poor condition, and lacks sufficient capacity to meet the service areas needs. Improvements will be made through installation of a parallel main or direct replacement.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$888	Aug 99	Sep 04
Easements	$43	Jul 01	Jun 02
Construction	$4,185	Jun 02	Sep 04
TOTAL:	$5,116		

Project History and Background

Section 26 extends north from Revere for 18,600 feet to serve four meters in Saugus and Lynn. In conjunction with other existing MWRA pipes in this area, this main at one time helped provide redundancy for East Boston, Winthrop, and Deer Island. This 16-inch cast iron pipe is 98 years old and has a C-Value of 57, which has reduced its carrying capacity by more than 50 percent. Since 1990, five repairs have been required along this main. A repair in November 1992 was impeded because the valves were inoperable, necessitating the installation of costly line stops. The very poor condition of the pipe makes rehabilitation impractical, and the small diameter of the pipe would not be capable of meeting the maximum day plus fire flow service goal.

Due to recent capital improvements within the Northern High Service Area, it may be possible to abandon a significant portion of Section 26, particularly between Revere Beach Parkway and Squire Road. An analysis of the contribution of Section 26 towards the Northern High Service Area will be evaluated during the preliminary design phase and the scope of work adjusted accordingly.

Scope

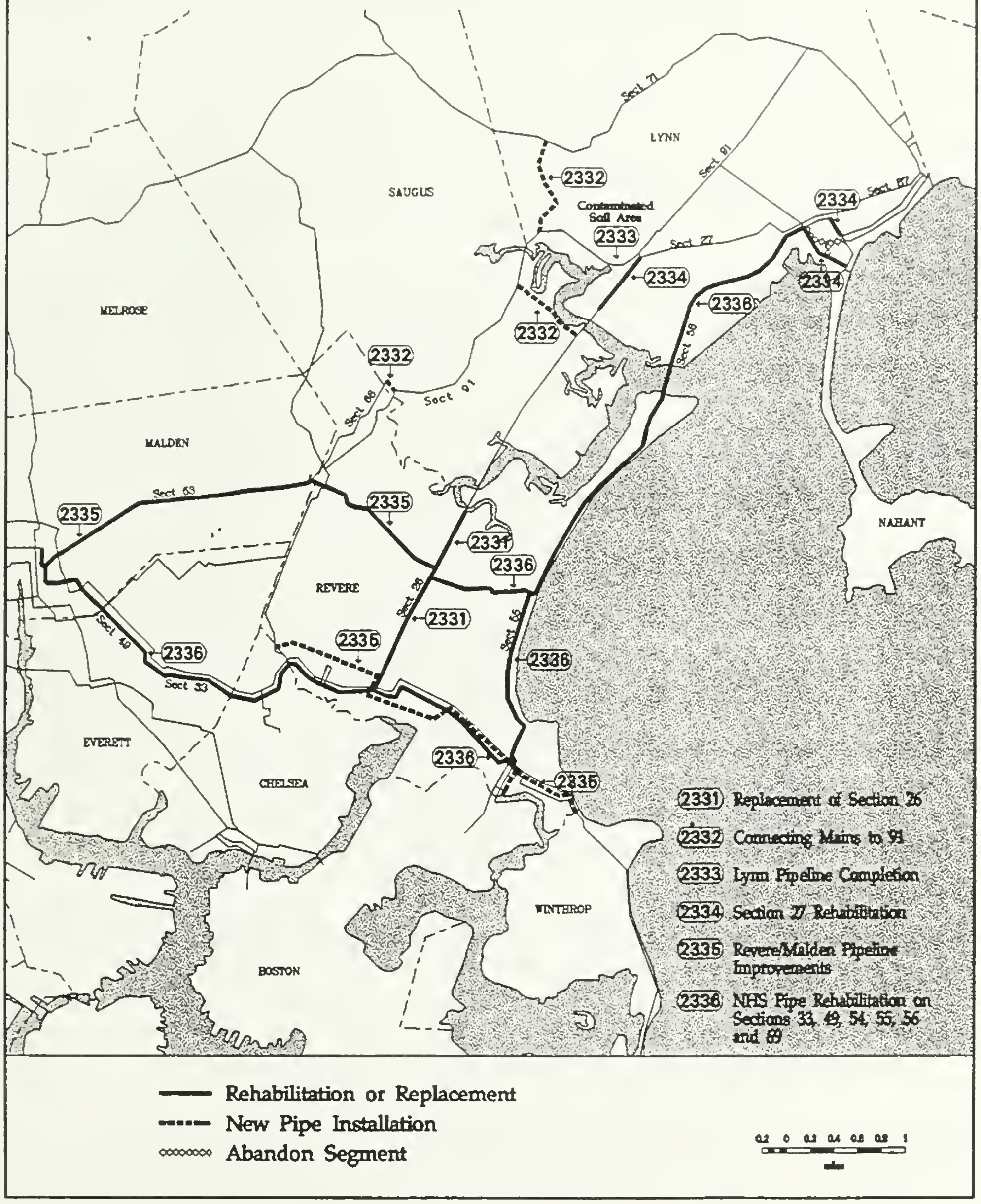
Phase	Scope
Design/CA/RI	Design, construction administration, and resident inspection of an 11,500 linear feet pipeline replacement. During the preliminary design phase, an analysis of the entire Northern High Service area will be made with the possibility of significantly reducing the scope of work for the Section 26 water main.
Easements	Easements along the construction route.
Construction	Replace approximately 11,500 linear feet from the Revere Beach Parkway line to Saugus Meter 125 with new 24-inch pipe.

Changes in Scope Since FY97-99 CIP

Phase	Change
Easements	Changed the name from Land.

CEB Impact None.

NORTHERN HIGH SERVICE PIPELINE PROJECTS 2331 - 2336


LYNN
SAUGUS
MELROSE
MALDEN
REVERE
EVERETT
CHELSEA
WINTHROP
BOSTON
NAHANT
Contaminated Soil Area
Sect 71
Sect 91
Sect 87
Sect 27
Sect 56
Sect 68
Sect 53
Sect 26
Sect 55
Sect 49
Sect 33
2331
2332
2333
2334
2335
2336
2331 Replacement of Section 26
2332 Connecting Mains to 91
2333 Lynn Pipeline Completion
2334 Section 27 Rehabilitation
2335 Revere/Malden Pipeline Improvements
2336 NHS Pipe Rehabilitation on Sections 33, 49, 54, 55, 56 and 69
Rehabilitation or Replacement
New Pipe Installation
Abandon Segment
0.2 0 0.2 0.4 0.6 0.8 1
miles

2332. Northern High Service - Connecting Mains to Section 91

Purpose

To integrate the new Section 91 pipeline with the existing grid network in the northeast portion of the Northern High Service system. Through various new connections, service pressures and reliability to community meters will be improved.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$1,424	Jun 95	Oct 02
Easements	$40	Jul 99	Jun 00
Construction	$5,972	Feb 00	Oct 02
TOTAL:	$7,436		

Project History and Background

Sections 91 and 92, installed under the Northern High Service Pipe Improvements-Lynn Pipeline project, have been completed except for a small segment of Summer Street. This major new transmission main will greatly improve flows and pressures to the entire northeast portion of the High Service Area. To gain the full benefit of this main, branches need to be constructed from it to tie into existing and proposed community meters as well as to existing MWRA mains. Three connections will serve this purpose.

The first connection is between Section 91 and Section 68 and will pass through Revere and Saugus and serve both towns. While the current pressure and flow rate of the existing Section 68 is considered adequate under average flow conditions, it does not meet the maximum day plus fire flow service goal defined in the Waterworks Master Plan for Saugus Meter 134.

The second proposed pipeline connects Section 26, a 16-inch diameter water main, to Section 91. The existing Section 26 provides adequate service under average flow conditions. However, the line does not meet the maximum day plus fire flow service goal. The pipeline will also provide a new connection to Saugus Meter 193.

The third proposed pipeline connects Section 91 with Section 71, and will improve the service to Nahant, Swampscott, Marblehead, Peabody, the General Electric (GE) facility in Lynn, Lynnfield, and Saugus. If Section 71 of the Northern High Service System was out of service, adequate service could be provided to serve communities under average flow conditions. However, the maximum day plus fire flow service goal could not be met for these communities. Under normal flow conditions, either Section 71 or 91 could be removed from service for inspection, maintenance, or repair without disruption of flow to these communities.

These improvements will fully integrate the new Section 91 into the Northern High Service Distribution System. Section 91 will become the primary feed for Saugus, and its increased capacity will improve the hydraulics for the town.

Scope

Phase	Scope
Design/CA/RI	Design, Construction Administration, and Resident Inspection of Section 91 interconnections to Sections 26, 68, and 71.
Easements	Easements along the construction route.
Construction	Installation of a 900 foot length of 24-inch diameter water main on Park Street in Saugus to connect Section 91 to Section 68 and Saugus Meter 134; construction of a new 3,800-foot water main of 16-inch diameter pipe on Ballard Street in Saugus to complete a loop betweeen Section 26 and Section 91, which will connect to Saugus Meter 193; and the installation of a new 5,700 linear foot, 36-inch diameter pipeline to provide a second connection between Section 91 and Section 71, forming a loop which will supply six meters serving the communities of Nahant, Swampscott, Marblehead, Peabody, the GE facility in Lynn, Lynnfield, and Saugus.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction	Change 3,800 linear feet of new 24 inch pipe to 3,800 linear feet of new 16 inch pipe.

CEB Impact

None.

2333. Northern High Service Improvements - Lynn Pipeline

Purpose

To install a new primary supply line for the northeast section of the Northern High Service System. The furthest reaches of this service area frequently experience hydraulic deficiencies due to the inadequate capacities of existing pipelines. When this new main comes on line, it will efficiently carry high service flows to north shore communities and will reduce the need for pumping from the Spot Pond station to the Northern High System. More than seven miles of new pipeline will be constructed as part of this project.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$1,634	Apr 88	Jul 98
Construction	$12,209	Jun 82	Jul 98
Technical Assistance	$170	Jun 82	Jul 98
TOTAL:	$14,013		

Project History and Background

The northeast corner of the Northern High Service System serves Marblehead, Swampscott, Nahant, Peabody, and Lynn. The existing pipelines are undersized for the current peak demand of the area. Upgrading the service entails furnishing and laying 37,750 linear feet of 48-, 36- and 24-inch ductile-iron or reinforced concrete and steel pipes, valves, and related appurtenances in Lynn.

Alternative routes have been investigated, and the final design for the selected route is underway, along with plans for handling the contaminated soil and groundwater.

The contaminated soil and groundwater will be addressed in accordance with DEP requirements. For this project a Utility Related Abatement Measure (URAM) will be the plan used by the MWRA to address how the contamination is properly handled.

Scope

Phase	Scope
Design 2/CS/RI	Design, construction services, and resident inspection of Construction Phases 2, 4, and 5.
Design /CS/RI	Design of the removal of contaminated soil, and preparation of alternative analyses for installation of a 900-linear foot pipeline on Summer Street.
Construction 2	Construction of 6,600 linear feet of pipeline through Saugus.
Construction 3	Construction of a 900 foot section on a site on Summer Street.
Construction 4	Construction of 5,000 linear feet of pipeline on Washington Street.
Gas Main-Washington Street	Relocation of a gas main on Washington Street.
Traffic System-Washington Street	Study for traffic control on Washington Street.
Construction 5	Installation of 10,000 linear feet of pipeline on Western Avenue.
Technical Assistance	Technical assistance in the design and construction of the pipelines.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2334. Northern High Service - Section 27 Improvements

Purpose

To replace a segment of 98-year old pipe in Lynn which suffers from poor hydraulic performance and frequent leakage. Replacement with 7,600 linear feet of new pipeline will improve service to the communities north of Lynn.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design	In-house	Sep 97	Feb 02
Borings-Section 27	$9	Jan 98	Mar 98
Construction	$2,805	Sep 00	Feb 02
TOTAL:	$2,814		

Project History and Background

Section 27 is a 12- to 20-inch diameter cast-iron main installed in 1898 which serves the communities north of Lynn. The main has become severely corroded through graphitization, a corrosion process which affects cast iron. As a result of this deterioration, nine major leaks have occurred since 1976, most of which have occurred in the last six years. Since the main runs under major thoroughfares in Lynn, repair of emergency leaks is disruptive and costly. Appropriate corrosion control methods will be employed on the new pipeline to minimize corrosion potential in Section 27. During preliminary design, an evaluation will be made to determine whether an adjacent pipeline, Section 35, should be rehabilitated concurrently.

Scope

Phase	Scope
Borings-Section 27	Borings along the construction route to determine sub-surface conditions.
Construction - Section 27	Construction of 7,600 linear feet of pipeline to replace the existing severely corroded pipe.

Changes in Scope Since FY97-99 CIP	None.
CEB Impact	None.

2335. Northern High Service-Revere and Malden Pipeline Improvements

Purpose

To improve the delivering capabilities of major distribution lines serving the Northern High System. The existing pipelines are hydraulically inadequate and suffers from extensive corrosion and leakage. Replacement, rehabilitation and/or reinforcement with a new larger diameter pipeline, nearly four miles in length, will provide a strong and reliable means to convey water from the City Tunnel Extension to communities within the northern and eastern portion of the Northern High Service area.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	$1,987	May 88	Jun 03
Construction	$28,421	Jun 88	Jun 03
Easements	$22	Jul 99	Jun 00
Technical Assistance	$183	May 88	Jun 03
TOTAL:	$30,613		

Project History and Background

The southeast corner of the Northern High Service System has experienced pressure deficiencies due to undersized pipes and extensive pipeline corrosion. The corrosion problems have led to numerous leaks, and the pressure deficiencies cause firefighting difficulties. These deficiencies particularly affect Malden, Revere, Lynn, Winthrop, Deer Island, East Boston, Saugus, Nahant, Peabody, Marblehead, and Swampscott. To correct these problems, a series of pipeline improvements have been planned for the Northern High Service region.

A hydraulic study of the MWRA distribution system recommended that a new pipeline be installed in Revere, beginning at the Everett/Chelsea/Revere border and extending through Revere to East Boston border.

This new pipeline runs parallel with existing pipelines and carries a large portion of the flow formally carried by the existing system, thereby increasing water pressure and flow to Revere, East Boston, Winthrop, and Deer Island, particularly during periods of high demand.

Control valves were required to regulate water pressure and fill the Winthrop standpipe. The original control valves between Winthrop pipelines and the MWRA transmission mains were inadequate. Fluctuations in pressure threaten to rupture the town's pipelines. More efficient valves were required to eliminate the danger.

Flow tests performed on Sections 32 and 55 of the existing Revere and Winthrop pipeline revealed that these sections had severe flow problems. The pipeline was only able to carry a fraction of its designed capacity due to internal corrosion. Cleaning and lining the pipeline restored flow capacity.

Section 53 in Malden and Revere was an 18,900 foot long, 30-inch steel pipeline, exceeding 60 years of age. Workers dug four test pits to determine the condition of this pipeline and uncovered 18 holes in the pipe. Investigations into recent failures revealed severe corrosion through the pipe wall in several separate locations. Therefore, replacement of the entire pipeline with a 48-inch (Malden) and 36-inch (Revere) transmission main that is able to support greater water demand was required. In addition to feeding into the new 48-inch Saugus/Lynn pipeline, this pipeline will play an important role in the supply network for Deer Island. Section 53A, an old 24-inch pipeline, is used to connect Section 53 to Shaft 9A of the City Tunnel. It is undersized for this purpose and is a severe restriction. A new 3,000-foot, 60-inch diameter pipeline is needed to reinforce Section 53A. An 850-foot portion of Section 68 interconnects Section 53 with the new Saugus/Lynn pipeline. This section needs to be reinforced with 850 feet of 48-inch pipeline.

All of the work for this project, with the exception of the design and construction of Section 53, Revere 53A, and Section 68 is complete.

Scope

Phase	Scope
Des/CS/RI-Revere/Malden	Design, construction services, and resident inspection for Section 53 in Malden and Section 97/97A in Revere.
Construction-Revere Beach	Installation of 5,491 linear feet of 36-inch pipeline and 10,111 linear feet of 30-inch pipeline on Section 97, as well as 3,872 linear feet of 24-inch pipeline, and 1,350 linear feet of 20-inch pipeline on Section 97A in the vicinity of Revere Beach Parkway.

Construction - Malden 53	Installation of 11,907 feet of 48 inch diameter pipeline in Malden on Section 53.
Landscaping	Payment to City of Malden for landscaping of traffic islands at the intersection of Route 60 and Eastern Ave.
Construction Assistance -Malden	Construction assistance for segment of Section 53 located in the Linden Square area of Malden.
Design-Revere Section 53	Design of Section 53 pipeline in Revere.
Construction - Revere Section 53	Installation of 6,000 feet of 36-inch pipe in Revere on Section 53.
Easements	Easements negotiated along the construction route of Section 53 in Revere.
Construction Assistance Linden Square	Construction assistance for the segment of Section 53 located in the Linden Square area of Malden.
Construction - Linden Square	Construction of a 1,000 linear foot segment of Section 53 in the Linden Square area of Malden. The Massachusetts Highway Department has constructed this section as part of its roadway reconstruction around Linden Square.
Design/CA-Eastern Ave Road Restoration	Design of the full road restoration to ensure a stable road surface without cracking, on Eastern Avenue in Malden.
Construction-Eastern Ave Road Restoration	Construction of the full road restoration to ensure a stable road surface without cracking, on Eastern Avenue in Malden.
Construction Eastern Ave Sidewalk Restoration	Construction of sidewalks along Eastern Ave in compliance with the Architectural Access Board. This work will be done by the City of Malden.
Design-Control Valves	Design of the control valves needed to regulate water pressure and fill the Winthrop standpipe.
Construction-Control Valves	Construction of the control valves needed to regulate water pressure and fill the Winthrop standpipe.
Design-DI Pipe Cleaning and Lining	Design of the cleaning and lining of the 2,000 linear foot, eight-inch diameter water supply main to Deer Island.
Construction-Cleaning and Lining	Construction of the cleaning and lining of the 2,000 linear foot eight-inch diameter water supply main to Deer Island.

Design/CS/RI-53A & 68	Design, Construction Services, and Resident Inspection of two new connecting mains in Malden.
Construction-53A & 68	Construction of 850 linear feet of new 48-inch pipeline paralleling Section 68 which will connect Section 51 to Section 91 and 3,000 linear feet of new 60-inch pipeline (Section 53A) which will connect Shaft 9A to Section 53.
Design-Winthrop Cleaning and Lining	Design of the rehabilitation of Sections 32 and 55.
Construction-Winthrop Cleaning and Lining	Construction consists of rehabilitation of 7,900 linear feet of 16-inch diameter pipe on Section 32 and 20-inch diameter pipe on Section 55 in Revere and Winthrop
Technical Assistance	Technical assistance for all phases of construction

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction Eastern Ave Sidewalk Restoration	New phase.

CEB Impact

None

2336. Northern High Service-Pipeline Rehabilitation

Purpose

To rehabilitate a number of small diameter distribution pipelines near the coastline from East Boston north to Lynn. All of these cast-iron mains are unlined with C-values below 70, and most are more than 60 years old. Improvements will primarily involve cleaning and lining and valve replacement.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$2,436	Oct 00	Dec 09
Construction	$11,467	Feb 05	Dec 09
Appraisal/Easements	$130	Jul 04	Jun 05
TOTAL:	$14,033		

Project History and Background

Pipeline Sections 33, 49, 54, 55, 56, and 69 in Malden, Everett, and Revere deliver water from the vicinity of Shaft 9A of the City Tunnel in Malden to the eastern and northern reaches of the Northern High Service System, including Everett, Revere, East Boston, Winthrop, Saugus, Nahant, Marblehead, and a portion of Lynn. The carrying capacity of these sections ranges from 50 to 60 percent of the original design capacity (C-Values: 61 to 73) due to a build up of rust deposits and other matter along the pipeline.

Scope

Phase	Scope
Design/CA/RI	Design, construction administration, and resident inspection of the rehabilitation of Sections 33, 49, 54, 55, 56, and 69. Exploratory excavation and corrosion analysis will be performed during preliminary design to evaluate the structural integrity of the pipe, the condition of the bedding material, and the extent of pipe corrosion.
Appraisal/ Easement	Easements to be negotiated along the construction route.

Construction	Construction, which consists of the rehabilitation of 30,000 linear feet of 24-inch pipe on Sections 33, 49, 54, and 69, and 33,000 linear feet of 20-inch pipe on Sections 55 and 56. Rehabilitation is expected to consist primarily of cleaning and lining of the interior pipeline walls, as well as replacement of existing line valves, air/vacuum valves, and blow-off valves.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2337. Northern Extra High Service-New Pipelines

Purpose

To improve hydraulic service and reliability for major portions of the Northern Extra High System. Existing lines are undersized and frequently experience low pressure problems. Improvements will involve rehabilitation of two pipe segments and installation of a new parallel main into Waltham.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CA/RI	$591	Sep 94	Jun 00
Appraisal/Easements	$22	Jul 98	Jun 99
Construction	$2,511	Mar 99	Jun 00
Regulatory Compliance	$1	Nov 95	Jun 96
TOTAL:	$3,125		

Project History and Background

Sections 45, 63, and 83 provide service to the Northern Extra High communities of Waltham, Lexington, and Bedford. The existing pipelines are not large enough to meet maximum day plus fire flow service goals. The community benefits realized by a new larger pipeline will include improved reliability, pressure, and flows, which will result in better fire protection and reduced pumping costs.

Scope

Phase	Scope
Design/CA/RI	Design, construction administration, and resident inspection of two pipe phases.
Appraisal/ Easement	Easements to be negotiated along the construction route.
Regulatory Compliance	Disposal of contaminated soil.

Construction	Replacement of approximately 2,600 linear feet of Section 45 with 24-inch diameter pipe extending from the connection point at Meter 47 to Section 82 on Park Street at the intersection of Paul Revere Road in Arlington; installation of about 2,100 linear feet of new 24-inch pipeline, parallel to a portion of Section 83, starting from the Meter 182 to the intersection of Waltham Street (in Lexington and part of Waltham) and Concord Avenue (in Lexington). Rehabilitation of Section 63, consisting of about 3,400 linear feet of 20-inch pipeline connecting Section 63 to Meter 136.

Changes in Scope Since FY97-99 CIP

Phase	Change
Construction	Combined the two construction phases into one. Change replacement of 2,600 linear feet of 30- inch pipe to 24-inch pipe.

CEB Impact None.

2338. Hydraulic Model Update

Purpose

To update the hydraulic model to incorporate all recent capital improvements to the Waterworks system. This project also includes reconfiguring all computer data files in such way as to utilize updated software features.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Hydraulic Model Update	$306	Jan 98	Jan 00
TOTAL:	$306		

Project History and Background

The MWRA Water System Model Study completed in 1990 by Camp, Dresser & McKee included the development of a computer based hydraulic model of the MWRA's water system. The transmission and distribution systems, pump stations, storage tanks, revenue meters, pressure reducing valves and other system appurtenances were incorporated into the model. The model was developed using software written by Stoner Associates, Inc. One of the main reasons for selecting Stoner was its ability to directly access databases on demand, Geographical Information Systems (GIS), and Supervisory Control and Data Acquisition Systems (SCADA).

The existing VAX/VMS operating system platform was changed to the desktop PC environment to make the model more accessible and user friendly to staff and because the software developer discontinued upgrading the former platform.

In addition to the recent improvements made to the computer hardware and software in the regards to the model, current Stoner data files need to be updated and enhanced. Some of the enhancements in the Stoner for Windows software include the ability to have a geographically accurate model, the ability to separate the whole system into individual service areas, model water quality, and efficiently update the system operational conditions through links to other maintained databases, including on-line modeling.

Since the hydraulic model was developed, an attempt has been made to keep pace with changes in the distribution system by incorporating new pipes into the model and periodically issuing new base files to the users. However, several other changes will benefit the hydraulic model, including the addition of appurtenances, updating community demands and updating our facilities that are undergoing rehabilitation.

This project will include updating the hydraulic model to reflect the MWRA's current system, including a geographically accurate model, individual pressure zones, addition of appurtenances, updating demands, and facilities. The model will also be reconfigured in such a manner that the model users will have the ability to link to and obtain information from the Chestnut Hill Operations Control Center, GIS databases, and in the future, the SCADA databases. The work will include calibrating the updated model through field testing performed by Distribution Section staff.

Scope

Phase	**Scope**
Hydraulic Model Update	Software revision to the computer based hydraulic model of the MWRA's water system.

Changes in Scope Since FY97-99 CIP None.

CEB Impact None.

2401. Central Monitoring System

Purpose

To provide a modern centralized system for monitoring, coordinating, and controlling critical waterworks functions. Many existing facilities are monitored and operated using obsolete methods and equipment, which can hinder emergency response capabilities and prevent coordinated system operation. An Operations Control Center is already operational, and various field facilities have been equipped with telemetry and communications equipment as part of this project.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Study	$190	Mar 84	Sep 86
Design/CS	$3,372	Oct 87	Aug 98
Construction	$5,679	Nov 92	Aug 99
Equipment Prepurchase	$2,919	Oct 87	Mar 99
Utility Installation	$29	Aug 96	Aug 99
Technical Assistance	$320	Jul 92	Aug 99
TOTAL:	$12,509		

Project History and Background

The Waterworks Division is planning to convert to system-wide remote monitoring and control of essentially all hydraulic and hydroelectric operations. The existing instrumentation used to measure operating parameters is incomplete, old, and in poor condition. In many cases necessary instrumentation does not exist. The current system also lacks telemetry to provide centralized and immediate information on system performance, and the ability to remotely intervene when malfunctions occur. Without telemetry, operating decisions are delayed until field personnel are dispatched to collect measurements. This is a cumbersome and undesirable mode of operation, particularly in emergency situations.

The lack of flow measurement within the water delivery system also impedes identification of sources of un-metered water. When fully implemented, the central monitoring system will generate instantaneous data on water flow and pressure in 18 subsystems beginning with the supply sources and ending at the delivery points to user communities. The data will assist operations staff in detecting and pinpointing leaks in the system. The response time for leak repair work can then be lessened, resulting in significant savings of water and reduction in potential MWRA liability for public safety and property damage.

Scope

Phase	**Scope**
Study	Study to determine the implementation phases.
Design	Design of the replacement and rehabilitation of 34 existing master meter sites, 22 new master meter sites, 15 western revenue meter sites, 28 reservoir level instrumentation sites, ten pumping stations, eight pressure regulator control sites, four major throttle valve sites, six chemical feed sites, four hydroelectric sites, five weather stations, five sluice gate control sites, one stream gaging station, and other facilities within the waterworks system.
Design - Operations Center	Design of the 5,000 square foot center including an environmentally controlled computer room, a printer room, a control room, office space, and sanitary facilities.
Construction Services	Construction services for operation control center, as well as metering and monitoring construction.
Communication Structures	Installation of two new radio towers, five antennas, one satellite dish, and an equipment shelter.
Construction 1: Bondsville and Wilbraham	Construction consists of the rehabilitation of the Bondsville throttling valves and the Chicopee and Wilbraham meters.
Construction 2: Reservoir Road and Cosgrove Pilots	Purchase of equipment to automate the Reservoir Road pumping station and an aqueduct monitoring system for use by the Cosgrove Intake and Shaft 4 operators. This work will be performed by in-house staff.
Construction 3: Metering and Monitoring	Purchase of Supervisory Control and Data Acquisition System (SCADA) equipment for monitoring and metering sites and pressure reducing valve sites. This work will be performed by in-house staff.
Construction - Operations Center	Construction of a 5,000 square foot center including an environmentally controlled computer room, a printer room, a control room, office space, and sanitary facilities.
Equipment Prepurchase	Purchase of instrumentation equipment, mechanical equipment, and new master meters.

Microwave Improvements	Purchase of services and equipment necessary to allow MWRA to convert from analog to digital communications to continue to utilize the Commonwealth's Interagency Microwave System.
Utility Installation	Connections of SCADA equipment to local utilities.
Technical Assistance	Technical assistance in the design and construction of the Operations Control Center and related equipment installation.

Changes in Scope Since FY97-99 CIP

None.

CEB Impact

CEB Line Item	Incremental Cost in FY98	Incremental Cost in FY99	Description
Labor	$0	$0	
Maintenance	$20,000	$10,000	Technical support for the Oracle -SCADA software.
Professional Services	$0	$0	
Electricity	$10,000	$10,000	Additional usage.
Telephone Data Lines	$2,500	$0	Additional data lines.
TOTAL	$32,500	$20,000	

2402. Rehabilitation of Existing Facilities

Purpose

To repair and upgrade various field facilities by improving buildings, tanks, bridges and grounds. Waterworks facilities are generally in deteriorated condition due to several decades of deferred maintenance and under-investment. Improvements include underground tank replacements, water tank inspection and rehabilitation, pipe and road bridge repairs, improvements required by life-safety and building codes, and miscellaneous equipment upgrades.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Design/CS/RI	In - house	May 89	Sep 07
Testing	$41	Jan 91	Jun 91
Subsurface Investigation	$563	Jul 91	Jul 99
Water Tank Inspection	$27	Oct 94	Nov 94
Facility Maintenance Equipment Purchase	$557	Oct 95	Mar 98
Construction	$6,442	Aug 92	Sep 07
Technical Assistance	$16	Jul 91	Sep 07
Facilities Maintenance Program	$4,000	Jul 96	Jun 00
TOTAL:	$11,646		

Project History and Background

Due to the advanced age of Waterworks Division's facilities, major repairs are needed to restore existing buildings and other structures to proper operational condition. This project is an ongoing program to evaluate the condition of facilities, to identify priority improvements necessary for the safety and welfare of MWRA staff and to ensure operational reliability, and then systematically rehabilitate all waterworks facilities in need of repair.

The Waterworks Division has a number of underground fuel tanks located at various facilities. U.S. EPA, DEP, and Department of Public Safety regulations require that all tanks be tested, that any defective tanks be replaced, and that any contaminated soil and water be remediated.

Scope

Phase	Scope
Testing	Testing of fuel tanks to evaluate operational status and condition of surrounding soil.
Design - Hyde Park Pump Station	Design of the rehabilitation of the Hyde Park Pump Station which houses 12 employees and is staffed 24 hours per day.
Construction - Hyde Park Pump Station	Rehabilitation included installation of new windows, doors, showers and locker room, rest rooms, an electrical power generator, a new roof, a new boiler, a new sound enclosure for a diesel pump engine, and electrical updating.
Subsurface Investigation	Environmental assessment of sites contaminated by leaking fuel tanks.
Design - Tank Removal Phase 1	Design for the removal of 16 out of service tanks from various locations.
Construction - Tank Removal Phase 1	Removal of 16 tanks from the following locations: construction field office in Stoneham, R. Lonergan Intake (Shaft 8) in South Barre, Mystic Shops in Somerville, Nash Hill Reservoir Service Building in Ludlow, Norumbega Reservoir and Weston Reservoir in Weston, Reservoir Road Pump Station in Brookline, Glenwood Yard in Medford, and Chestnut Hill Pipe Yard in Brighton. Removal and disposal of all contaminated soil at these locations.
Design - Tank Removal Phase 2	Design for the removal of four out of service tanks from various locations.
Construction - Tank Removal Phase 2	Removal of four tanks from the following three locations: Glenwood Yard, Lake Cochituate in Natick, and Quabbin Aqueduct - Shaft 9 in Barre. Removal and disposal of all contaminated soil at these locations.
Design - Tank Removal Phase 3	Design of the removal of one tank at Shaft 8.
Construction - Tank Removal Phase 3	Removal of one tank at the R. Lonergan Intake (Shaft 8). Removal and disposal of all contaminated soil at this location.
Design/CS/RI - Tank Replacement	Design, construction services, and resident inspection for the replacement of various fuel tanks.
Construction - Tank Replacement	Replacement of active service tanks along with the remediation of any contaminated soil and/or water.
Design/CS/RI - Newton St. Bridge	Design, construction services, and resident inspection of a pipe bridge, which is a 30-inch pipe over two railroad right-of-ways, which have been in service for 60 years.
Construction - Newton Street Bridge	Replacement of the pipe over two railroad right-of-ways; insulation and covering for the pipe.

Water Tank Inspection	Inspection of the existing interior and exterior paint systems on five of the system's water tanks that have exceeded their useful lives.
Design/CS/RI - Water Tanks	Design, construction services, and resident inspection of structural repairs and repainting the interior and exterior of five water tanks.
Construction - Water Tanks	Structural repair, and repainting of the interior and exterior of five water tanks at the Arlington Heights Standpipe, Turkey Hill Tank, Bellevue Standpipe #1, Bellevue Standpipe #2, and the Walnut Hill Tank.
Design - Stony Brook	Design of the bridge, which is a 14-foot wide concrete arch spandrel structure spanning 30 feet.
Construction - Stony Brook	Dismantling and rebuilding approximately 100 feet of spandrel wall, replacing bridge railings, and installing an electrical ductbank. Rebuilding of the wall will require excavation adjacent to the bridge. A concrete line plug will be installed underground in preparation for the Sudbury valve replacement (Dam Control Valve Project #2202). This plug insertion will be completed as part of this project to avoid redundant excavation and potential undermining of the bridge structure.
Design/CS/RI - Mystic River Bridge	Design, construction services, and resident inspection of the rehabilitation of the bridge girders, pipe supports, and cross bracing which are corroded.
Construction - Mystic River Bridge	Rehabilitation of the Mystic River Bridge girders, pipe supports, and cross bracing. Rehabilitation consists of repairing, sand blasting, and painting the girders; installing new pipe joint clamps; installing a new wood deck; replacing the handrails; repointing the granite abutments; and installing a handicapped access ramp.
Facility Maintenance Equipment Purchase	Purchase of capital equipment and materials necessary to allow in-house crews to repair Waterworks facilities throughout the system during the winter months.
Facilities Maintenance Program	A comprehensive evaluation, prioritization, and repair and rehabilitation program designed to systematically address capital improvements needs for all Waterworks facilities.

Changes in Scope Since FY97-99 CIP

Phase	Change
Facility Maintenance Equipment Purchase	Added budget for FY98 winter work program.

CEB Impact None.

2403. Distribution Systems Facility Mapping

Purpose

To produce a complete, up-to-date set of appropriate scale maps of all underground Waterworks facilities, along with a comprehensive database inventory. Existing maps are outdated and unreliable, which complicates emergency response, field repairs, and planning.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Planning/Design	$948	Feb 95	Aug 99
Data Purchase	$100	Aug 96	Nov 96
TOTAL:	$1,048		

Project History and Background

The Waterworks Division does not have an adequate, updated set of maps of all of its underground facilities. Existing maps do not consistently show current conditions and are often incompatible or contradictory with MWRA databases. Engineering, operations, and emergency response are all affected by this inadequacy. Outdated maps hamper engineering because maps must be re-created. Field operations crews cannot predict with certainty the results of valve shut-offs during repair efforts. The planning process is impaired because management does not have authoritative, consolidated data to evaluate pipe condition, age, C-Values, materials, and soil conditions. Additionally, the lack of a comprehensive understanding of the relationships between MWRA and local community pipe systems can result in service delays. The current mapping system creates the possibility of incorrect actions, and in critical instances could result in exacerbated property damage.

Scope

Phase	**Scope**
Planning/Design	Creation of a complete set of 200 to 400 scale maps of the distribution system with an associated, verified inventory of size, material, age, and condition of pipes.
Data Purchase	Purchase of project related data from Boston Edison.

Changes in Scope Since FY97-99 CIP

Phase	Change
Planning/Design	Added development of land base data for those towns that are not in the Boston Edison service area (data purchase phase) and which they have no plans to develop the data on their own.

CEB Impact None.

2404. Local Water Infrastructure Rehabilitation Assistance Program

Purpose

To provide financial support to local communities to replace, rehabilitate, and maintain their waterworks infrastructure.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Loans/Grants	$30,000	Jul 97	Jun 99
Repayments	($22,500)	Jul 98	Jun 2004
TOTAL:	$7,500		

Project History and Background

The MWRA is committed to providing cost effective, high quality water services that protect public health, promote environmental stewardship, and maintain customer confidence. Part of that mission is assisting member communities in providing high quality water from source to tap. This project is designed to assist local communities in obtaining capital to replace, rehabilitate, and maintain waterworks systems.

Objectives:

- To encourage communities to realize as much benefit as possible from the MWRA's planned waterworks capital program - the MetroWest Tunnel, covered storage, and the Walnut Hill Water Treatment Plant.
- To provide a financial mechanism to local communities to support local water infrastructure maintenance and rehabilitation.

Proposed characteristics of the program:

- $30 million over two fiscal years ($20 million in FY98, and $10 million in FY99): 75 percent interest-free loans, 25 percent grants to communities
- Five-year interest free loans (25% grant) allocated based on communities' share of MWRA water charges.

- Repayment of the interest-free loans in five annual equal installments.
- No local match required.
- Guidelines for project eligibility to be developed by the MWRA and the Advisory Board.

Scope

Phase	Scope
Loans/Grants	Loans and grants for MWRA water communities to replace, rehabilitate, and maintain their local water infrastructure.
Repayments	Repayment of the loans collected from participating MWRA water communities.

Changes in Scope Since FY97-99 CIP

Phase	Change
Loans/Grants	Changed from 100 percent loan to 75 percent loan and 25 percent grant allocation.

CEB Impact

None.

BUSINESS AND OPERATIONS SUPPORT

3101. North Maintenance Facilities

Purpose

To improve waterworks and sewerage staff operations by consolidating maintenance, operations, and equipment storage functions into a single new distribution facility serving the northern service area. This will relieve current maintenance operations overcrowding and adverse traffic impacts on neighborhoods abutting existing facilities. In addition, rehabilitate existing maintenance facilities at the Mystic Shops and Glenwood Yard.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Land/Building	$4,273	Jul 96	Mar 97
Design/RI/Construction Services	$2,648	Apr 90	Oct 01
Construction	$11,128	Jul 99	Oct 01
Technical Assistance	$9	ongoing	
TOTAL:	$18,058		

Project History and Background

When the MWRA was created in 1986, 80 employees and 22 vehicles were transferred from the MDC to the MWRA to support maintenance of the metropolitan waterworks system and the northern sewerage system. Over the past nine years, the Authority has invested in improved maintenance and repair of the systems. As a result, there are now 300 employees, 188 vehicles, and 50 pieces of heavy equipment devoted to maintenance activities in the north.

Despite the growth in personnel and equipment, the MWRA has not upgraded its northern maintenance facilities, with the sole exception of leasing some temporary space.

To facilitate an upgrade, the MWRA adopted the 1993 North Maintenance Facilities Plan. The plan calls for purchase of one new site to centralize Waterworks maintenance, and rehabilitation of two existing sites (Glenwood Yard and Mystic Shops) to house Sewerage maintenance crews. The plan also calls for rehabilitation of the Chestnut Hill Pump Stations and surplusing of three sites which the MWRA will no longer need. Upon completion of the planned work, the Authority will also be able to terminate its lease for temporary space at Linden St. in Somerville.

Waterworks maintenance crews are currently located at four sites: Linden Street, Chestnut Hill, Mystic Shops, and Glenwood Yard. The plan recommends purchase of a new site for a Distribution Maintenance Facility to replace the overcrowded Glenwood Yard site. The plan also calls for relocation of the trade shops at Mystic Shops to the new Distribution Maintenance site for purposes of consolidation and efficiency. To further increase operational efficiency, the MWRA's vehicle maintenance satellite facility at Linden Street will move to the new Distribution Maintenance Facility where most of the maintenance vehicles will be located. The Somerville Laboratory will also be relocated to the new site.

Sewerage Division crews are currently located at Winchester Yard, Linden Street, Mystic Shops, and the Charlestown Pump Station. The plan calls for consolidation at two sites, Mystic Shops and Glenwood Yard. Mystic Shops will house all sewerage trade shops, the metering maintenance crew and the TV inspection program. Glenwood Yard will house the administrative staff and maintenance crews for the Transport Department. In addition, TRAC sampling staff will also move to Glenwood Yard.

The North Maintenance Facilities Plan will result in the MWRA vacating three facilities: the East Boston Steam Station, the old Charlestown Pump Station, and Winchester Yard. The plan is to surplus these facilities back to the Commonwealth of Massachusetts, consistent with the MWRA Enabling Act which governs disposition of property which no longer has a waterworks or sewerage system use.

The North Maintenance Facilities Plan will be completed in FY2001 and result in adequate housing of the maintenance crews and equipment for the next 50 years.

The Waterworks Division is responsible for the Chestnut Hill and Distribution Maintenance phases. The Sewerage Division is responsible for the Mystic Shops and Glenwood Yard. The Law Division is responsible for the legal process required to surplus the Winchester, East Boston, and Charlestown Pump Station properties.

Scope

Phase	Scope
Design/CS/RI: Chestnut Hill	Engineering and design services to support planning for Chestnut Hill.
Design/CS/RI: Distribution - Maintenance Facility	Design for construction of a Waterworks Distribution Maintenance Facility.
Land/Building: Distribution - Maintenance Facility	Purchase of a site for a Waterworks Distribution Maintenance Facility to replace the Glenwood Yard/Mystic Shops and Chestnut Hill sites.
Construction: Distribution - Maintenance Facility	Renovation of the Distribution Maintenance Facility includes a building, enclosed fleet vehicle area, covered storage, and open area storage.
Design/CS/RI: Mystic Shops	Design for construction of the Mystic Shops phase of the project.
Construction: Mystic Shops	Rehabilitate the Mystic Shops facility.
Design/CS/RI: Glenwood Yard	Design for construction of the Glenwood Yard phase of the project.
Construction: Glenwood Yard	Rehabilitate the Glenwood Yard facility.
Technical Assistance: Glenwood Yard	Provide technical assistance to support Glenwood Yard rehabilitation.

Changes in Scope Since FY97-99 CIP

Phase	Change
Design/CS/RI: Chestnut Hill	Reduced the amount of funds for design.

CEB Impact There will be moving expenses associated with the four operating area relocations. Operating and maintenance expenditures are expected to be similar to those experienced at the current facilities.

3102. Fore River Preservation

Purpose

To maintain the integrity of the Fore River Staging Area (FRSA) located in Quincy for the support of the Boston Harbor Project and other MWRA activities while assessing disposition and development strategies and decisions.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
21 contract phases	$9,193	Oct 88	Nov 97

Project History and Background

In October 1987, the MWRA purchased the General Dynamics Shipyard in Quincy for $49.5 million. The site was purchased to provide a material laydown and staging area for the construction on Deer Island and Nut Island. Additionally, the MWRA's residuals processing facility is located at the FRSA. Approximately 51 acres have been designated for use on various construction contracts, and seven acres are required for the residuals facilities. At one time, the MWRA leased approximately seven acres of surplus space to the Fore River Shipyard and Iron Works to operate a ship repair facility which is no longer in operation. In addition, approximately ten acres of space and one building at the northern end of the site have been leased by the United States Naval Shipbuilding Museum. Presently, the MWRA is in the final stages of negotiations with a shipbuilder to purchase approximately 130 acres on the central and southern portions of the site. Until disposition and development decisions are made, it is imperative that the MWRA protect the value of land, buildings, vehicles, and equipment it has acquired.

The MWRA is committed to prudent investment in this facility. As investments are proposed, the Sewerage, Program Management, Support Services, and Finance Divisions jointly analyze the need for investment.

This process has resulted in the decision to move a Sewerage Division storage facility from a badly deteriorated building at Fore River to another larger facility which required only minor repairs.

This decision not only eliminated the need for costly renovations, but also eliminated the need to construct an additional pre-fabricated building proposed by the Sewerage Division for additional storage on Deer Island.

In order to maintain the integrity of the FRSA for harbor projects and other MWRA activities, 18 phases of repair or rehabilitation work have been identified. They include the replacement of cathodic protection systems, rehabilitation of Building #14, replacement of a water meter, repair of support equipment, and the installation of back-flow preventers and rectifiers.

Three of the five dry dock gates at the FRSA suffered from extensive corrosion. Two of the dry dock gates were leaking, and the problem was kept in check through continual pumping. The installation of cathodic protection will prevent further deterioration of the dry dock gates, but is not sufficient to prevent eventual failure of the dry dock gate.

Three elevators in the FRSA were repaired in order to meet state inspection and certification requirements. One of the repaired elevators is housed in the main office building, the second is required to make periodic inspections of a PCB transformer, and the third is in Building #4 and is required for material transportation.

Buildings #15 and #16 at the FRSA were erected in 1917 and are badly deteriorated. A structural analysis of the buildings was performed and renovations were made in accordance with Massachusetts Historical Commission guidelines.

The FRSA facility had six transformers which contained PCBs, which are considered hazardous substances. One transformer could not be used either by MWRA or any other potential user of the facility. Although the transformer was encased, it was possible that a leak could develop resulting in pollution to the Weymouth Fore River, which is 30 feet from the transformer. The transformer has been removed and sent to a licensed disposal facility.

A 400,000 gallon water tank provides a water supply to the diesel booster pumps in the event of a significant fire. The tank is an integral part of the FRSA fire protection system. The water tank was drained several years ago because the low level of activity in the FRSA did not require this protection. With the increase in activity, the MWRA must reactivate the tank to increase its fire protection capability in order to maintain a favorable insurance rate.

The fire alarm system at the FRSA was a slow response, antiquated system which was not compatible with the City of Quincy's system. The system was upgraded to current standards

Core and soil samples are preserved because they provide information crucial to engineering and construction, and provide a physical record of the material in which pipelines and tunnels are situated. Storage capabilities were inadequate to preserve the samples, and the volume of samples requiring storage is expected to increase more than six fold due to the planned increase in capital projects. The second floor of Building #52 at the FRSA has been renovated to provide for adequate geological samples storage.

Many of the mechanical devices at the Fore River, such as elevators, cranes, and battery chargers, operate on direct current power. These devices are currently powered using the 2,100 horsepower generator. Since the vast majority of direct current devices will not be used during construction of the treatment plant, operating the powerful generator wastes energy. Furthermore, the direct current cables have developed insulation leaks which may accelerate corrosion in underground piping. The installation of rectifiers will permit more efficient use of power.

A survey of the steam pipe thermal system revealed that more than 15,000 linear feet of the pipe on the exterior of the FRSA buildings is covered with asbestos insulation. Although 10% of the material which fell to the ground had already been removed, the remainder of the material will continue to degrade, flake off, and fall to the ground, creating a serious health hazard to the work force in the area and significant potential liability for the MWRA.

Building #86 is a 52-year old, single story wooden building with a concrete floor and gravel roof. It is painted with lead based paint, contains asbestos insulation, and is in need of repair. The lead concentration of the paint is 33.6 times the acceptable limit. The chipping lead based paint has become a health hazard and must be removed. The building will not be used by the MWRA and estimated demolition costs are less than estimated repair costs.

A small segment of railroad track on the branchline in Braintree near the Conrail merge is a potential hazard. Should a buried trestle deteriorate, train loads would be transferred to an embankment of unstable soil. Therefore, improvements must be made to the embankment to enable it to support these additional loads.

Building #19 is a 28,500 square foot, two-story building which currently does not meet minimum safety standards and is energy inefficient. The building is needed to eliminate overcrowding and substandard working conditions for South System Sewerage Division staff from the Transport Department, and the South Maintenance Yard. The facility will also include space for a carpentry and welding shop and will house one vactor jet truck and one sewer jet truck, as well as construction equipment and vehicles. The sewer jet trucks must be garaged because they are not designed to withstand sub-freezing temperatures.

The purpose of the FRSA Upland Phase II contract is to prepare these buildings for long-term storage and warehousing use for Deer Island and other MWRA facilities. The decision to use Building #1 for centralized warehousing and Deer Island spare parts storage has allowed a substantial reduction in the size of the dry storage building planned for Deer Island. Renovations to Building 4 will enable the MWRA to consolidate all of the Authority's records into a central Records Center (including the core borings) while vacating the buildings in the proposed sale area.

Design for all improvements have been completed in-house or through technical assistance consultants. The Support Services Division is responsible for all phases of this project except the rehabilitation of Building #19 and the embankment improvements, which are the responsibility of the Sewerage Division.

Scope

Phase	**Scope**
Cathodic Protection	Cathodic protection of three drydock gates.
Repair Elevators	Repair three elevators; decommission all others.
Rehab Bldgs 15 & 16	Rehabilitation included renewal of the roofs, repairs to the brick and mortar, window and door repair and replacement, and renovation of existing walls.
Rehab Bldg 14	Refurbish first floor.
FRSA Water Meter	Replacement of one water meter.
FRSA Repair Equip.	Repair, clean, calibrate, and service support equipment.

Back-flow Preventers	Installation of back-flow preventers.
PCB Transformer	Remove and send one transformer containing Polychlorinated Biphenyls (PCB) to a licensed disposal facility .
Water Tank Constr.	Install an electric heating system, corrosion protection, and insulation to reactivate a 400,000 gallon water tank.
Fire Alarm Upgrade	Installation of 10,000 linear feet of new cable from Quincy Fire Department Headquarters to the FRSA and replacement of wiring and retrofitting of 35 pull boxes.
Geological Storage	Renovation of the second floor of Building 52, including replacement of windows and doors, installation of insulation, sheet rock, fire sprinklers, fluorescent fixtures, and a seven kilowatt heater.
Install Rectifier	Installation of rectifiers to eliminate reliance on DC power system.
Asbestos Removal	Removal and disposal of 13,500 linear feet of exterior asbestos pipe insulation.
Demolition - 86	Demolish Building 86.
Embankment Improvements	Repairs consist of adding sidehill fill to areas along an embankment of unstable soil.
Building 19 Rehab	Rehabilitation consists of cleaning and demolition; replacement of energy-inefficient doors and windows; electrical system improvements; and installation of new HVAC, plumbing, and fire protection systems, interior partitions, floor coverings, ceilings, and a new interior staircase. Also includes purchase of a backhoe for the Transport Department.
ESDC - Bldg 19	Engineering services to support Building 19 rehabilitation work.
Tech Asst - Bldg 19	Technical assistance to support Building 19 rehabilitation.
Geological Shelving	Industrial strength shelving required to store core samples in the newly renovated records storage area.
FRSA Upland Phase II	This contract will complete the rehabilitation of Buildings #1 and #4, including interior build-out of storage and office facilities as well as reconstruction of substation #1, which is needed to provide reliable power to these and other FRSA buildings.
Dry dock Pumps	The purchase of pumps required to de-water the dry docks.
Equipment Inspection	The purchase of a TV inspection truck required to conduct internal infrastructure inspection.
Hazardous Waste	Transferred phase from Wastewater.

Changes in Scope Since FY97-99 CIP	None

CEB Impact	None.

3103. Technical Assistance

Purpose

To ensure ready access, on an as needed basis, to professional and technical services not available from in-house staff.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Technical Assistance	$5,301	Dec 91	Oct 99
TOTAL:	$5,301		

Project History and Background

Efficient implementation of the MWRA's Capital Improvement Program often requires specialized skills and technical assistance which are not available from in-house staff. This project ensures ready access to a variety of skills on an as-needed basis through a series of task order contracts with pre-set limits. A division director can request a task order when immediate expertise on capital projects is required.

This project budget includes funds for actual and projected use of technical assistance for FY97-99. Charges incurred through the first quarter of FY96 are included in the FY97-99 CIP project budgets which utilized these services.

Scope

Phase	Scope
Technical Assistance	Technical assistance contracts include the following engineering and other skills: sanitary, electrical/HVAC, mechanical, structural, materials testing, environmental testing, geotechnical, surveying, hazardous materials assessment, asbestos assessment and design, architecture/landscaping, instrumentation/control, wetland/environmental, civil engineering, land appraisal, cost estimating, and energy.

Changes in Scope Since FY97-99 CIP	None.
CEB Impact	None.

3104. Business Systems Plan

Purpose

To adapt to the changing business needs of planning and managing the waterworks and sewerage systems, the MWRA initiated a business system planning effort to develop and procure management information systems (MIS) in support of business functions.

Expenditure Forecast and Schedule

Phase	Total Contract Amount ($000)	Begin date	End date
Phase I (FY95-97)	$2,053	Jul 94	Jun 97
Phase II (FY97-99)	$2,395	Jul 96	Jun 99
Phase III (FY99-01)	$0	Jul 98	Jun 01
Building 36 - Generator	$229	Oct 94	Jun 96
TOTAL:	$4,677		

Project History and Background

During the budget development process for the FY94-96 Capital Improvement Program, it became clear that future capital investments would be required to upgrade, enhance, and potentially expand the MWRA management information systems (MIS) in order to adapt to the changing business needs of planning and managing the waterworks and sewerage systems, and to respond to new regulatory requirements. In order to address these needs, the MWRA initiated a business systems planning effort to determine its future MIS support requirements

Because of rapidly changing technology and limits on the MWRA's ability to forecast long-term MIS needs, the decision was made to have the initial business systems plan focus primarily on the FY95-97 period (Phase 1), with updates occurring every year thereafter. The MWRA anticipates that publication and annual updates of the plan will assist staff, external constituencies, and the Board of Directors in understanding the critical role of information systems in carrying out the MWRA's environmental and economic mission. In addition, the plan provides comprehensive documentation for future resource requirements.

In January 1993, work group sessions led by a planning support team of MIS and Rates and Budget Department staff were conducted with the Sewerage and Waterworks Divisions. The plan incorporated maximum reuse of existing assets and captures economies through shared databases, applications, and hardware.

In early 1996, Phase II (FY97-99) was introduced to the Board of Directors. This phase builds on the progress made during Phase I and continues to consolidate the work of MWRA information systems. Phase II continues to develop economies of scale through optimization of existing assets, technology conversion promoting database integration, and infrastructure improvement. The objective of Phase II is to increase staff productivity and seek cost savings where applicable. The proposed changes complement the MWRA Business Planning efforts currently underway. Phase III (FY99-01), to be developed in 1998, will further enhance MWRA-wide work process improvements.

Scope

Phase	**Scope**
Phase I (FY95-97)	Hardware: Upgrade Boston Harbor Project technical minicomputers; purchase a Unix based minicomputer for GIS integration and consolidation and work stations for high-end modeling (SAMS) and mapping functions; upgrade/replace PCS; improve storage requirements for the TRAC IS and wastewater flow data; and lease three replacement minicomputers for administration and finance systems to address capacity and performance issues. Software: Implement and enhance the Sewerage Analysis and Management System (SAMS) to incorporate improved hydraulic modeling capabilities, condition information, mapping, and GIS data so that CSO Master Plan and Transport data requirements are met. Upgrades and enhancements to the TRAC/IS to address improved enforcement, monitoring, permitting, and integration of information with other systems. Upgrade the GIS application to the industry standard to allow more integration and analysis of data.

Phase I (FY95-97) continued...	Implementation of CADD software and related tools including the establishment of a document management system to index thousands of engineering documents maintained by the Records Management Center and Sewerage Technical Information Centers at both CNY and Deer Island. Network: Replacement of obsolete software used for access to administration, finance, and technical minicomputer applications. Develop a network plan for future BSP updates that address industry changes, maintenance/replacement concerns, and functionality needs.
Phase II (FY97-99)	Phase II consists of eight elements key to the continued productivity of MWRA staff. The eight elements are: (1) server consolidation, (2) network scalability program, (3) database integration program, (4) PBX replacement, (5) electronic records program, (6) procurement replacement, (7) maintenance management, and (8) waterworks programming services. Server consolidation: Improvement of the storage capacity, availability and manageability of the servers used by MWRA staff. This includes consolidating the 30 individual, independent file servers to approximately five, while avoiding the cost of hiring several server administrative staff to manage the resources. Network scalability program: Improvement of the data network by increasing the data access and retrieval to meet current and projected demand over the next several years. Database integration program: Standardize the programming/database environment between portfolios by converting to Oracle-based systems (the standard for water and sewer systems) and consolidating/integrating data across the organization. Thus providing improved reporting and programming resource management at overall lower cost by avoiding large increases in positions.
Phase II (FY97-99) continued...	PBX replacement: Replacement of the current Siemens Private Branch exchange (PBX) switches at the Charlestown Navy Yard with equipment that has a projected useful life of 10 years. Neither the PBX system or replacement parts are currently manufactured resulting in high risk of extended and/or complete system failure. Electronic records program: Establishment of computing resources, procedures, and training necessary to satisfy audit and good practice requirements for security and file management; and expected federal/state regulations regarding electronic public records. Procurement replacement: Replacement of the existing software (Purchase Stores Inventory or PSI) that is obsolete and will not be upgraded/updated by the vendor.

Phase II (FY97-99) continued...	Maintenance management: Automated maintenance software and corresponding hardware to replace obsolete Hewlett Packard maintenance software where it is currently used, and to provide systems support for areas currently using manual tracking methods. Waterworks programming services: Programming services to meet the requirements of water quality testing as a result of the water quality work process improvements being conducted as part of the business planning process.
Phase III (FY99-01)	To be determined.
Building 36 Generator	Purchase and installation of a back-up generator for Building 36 in the Charlestown Navy Yard.

Changes in Scope Since FY96-98 CIP

Phase	Change
Phase II (FY97-99)	New phase.
Phase III (FY99-01)	New phase.

CEB Impact

	($000)				
CEB line item	**FY98**	**FY99**	**FY00**	**FY01**	**Description**
Other	$57	$102	$130	$240	Maintenance, licensing fees, and electronic records management.

4001. Capital Budget Contingency

Purpose

There are certain costs associated with the Capital Improvement Program that are not possible to predict with any degree of certainty. These costs include legal fees, settlement of claims, acquisition of land, and a variety of study, design, and construction change orders and contract amendments.

A capital budget contingency is needed to authorize the expenditure of funds to cover these costs. The amount necessary for the contingency is calculated using the methodology described below. At the end of each fiscal year, any remaining funds in the contingencies lapse and new contingencies are created based on the new fiscal year budgets for the projects.

Boston Harbor Project

For non-tunnel Boston Harbor related projects the contingency is 10% of annual expenditures. The contingency for tunnel construction is 15% of annual expenditures because of the greater risks of tunnel construction. The BHP contingency fund is monitored and reported separately, and no transfers between the contingency funds are permitted.

Other Projects

A separate contingency fund, the “Other Projects “ contingency fund, provides the contingency for all non-BHP projects and is calculated as 10% of the annual expenditures for all other Wastewater, Waterworks, and Administration capital projects.

MetroWest Tunnel

The MetroWest Tunnel project will utilize the Other Capital Projects contingency fund. The total contingency amount calculated for the MetroWest Tunnel project is 15% for all tunnel contracts and 10% for all other phases. The MetroWest Tunnel contingency is also allocated so that there are more contingency funds available in the latter half of the construction schedule. The objective of this approach is to provide more contingency funds when a greater number of change orders and claims are likely to be processed and settled.

Summary

The total contingency required for the $3.1 billion ten-year (FY97-06) program period is $309 million. The three-year contingency budget (FY97-99) period is $117.2 million.

The MWRA contingency budget policy is included in Appendix D.

Detail of Projected Contingency

Fiscal Year	Boston Harbor Project Contingency	Other Capital Projects Contingency	TOTAL
1997	$26,761	$15,102	$41,863
1998	19,529	19,782	39,311
1999	14,824	21,241	36,065
2000	4,922	39,739	44,661
2001	0	52,418	52,418
2002	0	39,205	39,205
2003	0	27,035	27,035
2004	0	14,159	14,159
2005	0	8,459	8,459
2006	0	5,935	5,935
TOTAL	**$66,036**	**$243,075**	**$309,111**

APPENDICES

APPENDIX A
MWRA ACCOMPLISHMENTS: COMPLETED CAPITAL PROJECTS
(AS OF JUNE 1996)

WASTEWATER PROJECTS

Project	Total Cost ($000)	Completion Date	Accomplishment
Residuals Management -Interim Phase	99,777	Feb 92	Terminated sludge discharge to Boston Harbor
East Boston Pump Fac.	48,160	Jan 93	Eliminated sewage backup
Clinton Wastewater Treatment Plant	37,035	Sep 92	Improved water quality
Charlestown Pump Station Replacement	35,700	Apr 93	Ensured efficient pumping operations
D.I. Pump and Power Station Upgrading	31,953	Feb 91	Prevented sewage surcharges
D.I. Remote Headworks Improvements	25,426	Oct 89	Restored headworks capacity
D.I. Sedimentation Tank System Improvements	19,626	Jul 89	Restored operating efficiency of the tank system
Residuals Management - Walpole Landfill	15,025	Sep 93	Developed a minor residuals landfill plan
Nut Island Immediate Upgrade	9,557	Dec 86	Upgraded and replaced obsolete equipment
D.I. Intermediate Upgrade	9,526	Jun 92	Upgraded the D.I Treatment Plant Facilities
D.I. Digester Rehabilitation	7,354	Oct 86	Restored operating efficiency of the digesters
Wastewater Metering	7,324	Dec 93	Provides accurate flow data
Commercial Point CSO Facility	7,140	Feb 91	Improved Water Quality
Millbrook Valley Interceptor Relief Sewer	6,176	Mar 88	Increased flow capacity to eliminate surcharges
Reading Pump Station Replacement and Extension Relief Sewer	5,436	Sep 87	Eliminated surcharges, reduced staff requirement, and corrected safety hazards
Interim Scum Management	4,203	Jul 89	Provided an interim scum processing solution

Project	Total Cost ($000)	Completion Date	Accomplishment
Fox Point CSO Facility	4,164	Apr 89	Eliminated sewage discharges
Hingham Pump Station	3,014	Apr 92	Eliminated sewage discharges
D.I. Dual Fuel Engine/Generator	2,989	Dec 89	Ensured uninterrupted electricity supply
Southern System Modeling	2,607	Jun 88	Provided flow data for system capacity assessment
D.I. Island Chlorination Facility Rehabilitation	2,474	Mar 89	Ensured effective disinfection operation & a safe working environment
D.I. Electrical Equipment Upgrade	2,382	Mar 89	Restored the operating efficiency of the system
D.I. Sludge Thickeners Rebuilding	1,918	Sep 87	Ensured efficient operation of the D.I. Treatment Plant digesters
Bell Isle Siphon Rehabilitation	1,918	Apr 89	Reduced salt water infiltration and increased system capacity
Sewerage Division Management Services	1,861	Dec 86	Provided engineering design and construction advice
Harbor Environmental Studies	1,753	Jun 92	Studied water quality of the harbor
Somerville Marginal CSO Rehabilitation	1,697	Feb 89	Eliminated inadequately treated sewage discharges
Alewife Brook Parkway Pump Station Rehabilitation	1,455	Apr 89	Rehabilitation will bring the pump station up to existing code requirements
Deer Island Treatment Plant Outfall #002 Repair	1,300	Mar 96	Repaired damaged section of Outfall 002, one of the two main effluent discharge outfalls at Deer Island. Will serve as a back up for the new D.I. effluent outall tunnel.
Comprehensive Safety Action Project	1,279	Nov 90	Corrected safety hazards at the facilities and established ongoing safety management program
Constitution Beach CSO Facility	1,265	Sep 87	Eliminated untreated sewage discharges into Boston Harbor
Nut Island Intermediate Upgrade	1,864	Dec 92	Ensured effective operation of the Nut Island Treatment Plant
Shade's Siphons	765	Sept 88	Eliminated seawater inflows and sewage overflows
D.I. Operation & Construction Coordination Program	733	Jan 89	Provided coordination services for operations and construction activities

Project	Total Cost ($000)	Completion Date	Accomplishment
Cottage Farm & Charlestown Pump Repair	452	Dec 87	Restored system operation to its full capacity
D.I. Odor Monitoring	334	Feb 89	Provided data for the odor management plan
Watertown Siphon Reconstruction	328	May 88	Extended the useful life of Watertown's sewer system
D.I. Sludge Grinding	291	Jun 87	Improved the grinding system
Southwest Corridor CSO	290	Fall 86	Eliminated combined sewage overflows
Moon Island CSO Facility	290	Sep 86	Examined options for CSO treatment
D.I. Microwave Equipment Replacement	235	Nov 86	Replaced obsolete equipment
Industrial Discharge Limitations	215	Aug 86	Developed industrial discharge limitation guidelines
Porter Street Construction	136	Sep 93	Reimbursement to Central Artery project for CSO related construction
Cottage Farm CSO Ventilation System Repair	133	Sep 94	Rehabilitation of the HVAC duct work to provide a safe and habitable facility for MWRA staff
Bremen St Siphon Replacement	102	Mar 90	Evaluated siphon condition
Chelsea CSO Facility	90	Jan 91	Eliminated sewage overflow
Boston Gatehouses	65	Dec 86	Identified alternatives to minimize construction impacts
Industrial Waste-Technical Support	63	Oct 86	Provided laboratory services for the Toxics Reduction and Control Department
St. Mary's Street CSO Modifications	17	Feb 87	Identified solution for stormwater detention
TOTAL WASTEWATER	**$404,475**		

WATERWORKS SYSTEM IMPROVEMENTS PROJECTS

Project	Total Cost ($000)	Completion Date	Accomplishment
Water Meter Modernization	12,947	Sep 94	Improved the systems's revenue meters which measure flows delivered to customer communities
Northern Intermediate High Pipelines	11,419	Nov 88	Increased pipe capacity & pressure
Domestic Device Retrofit	10,332	Dec 93	Installed water saving devices
Long-Range Water Supply	5,579	Apr 89	Identified water supply programs
Transmission Maintenance Facility	4,866	Jun 93	New maintenance & operation facility
Hultman - Weston Aqueduct Transfer for Hydropower	4,515	May 89	Produces approximately 3,700,000 kw hours/yr of electricity
Weston Reservoir Chlorination Facility	2,558	Jun 93	Replaced obsolete equipment
Local Source of Supply	2,098	Jul 95	Promoted effective protection of existing local supply sources.
Leak Detection Survey	1,970	Aug 90	Provided data on the magnitude and location of water leaks
Northern Low Service - Sec 57	1,814	Oct 87	Restored pipe capacity and pressure
Norumbega Chlorination Facility	1,482	Mar 89	Provided a new disinfection facility for the water supply
Water Distribution Master Plan	1,177	Mar 93	Provided database and recommendations for master plan
Oakdale Power Station Generator Repair	945	Sep 91	Repaired substation metering and transformer systems
Northern Immediate High Service	926	Aug 92	Increased water treatment capacity
Reservoir Risk Assessment	647	Jun 92	Developed maps and data to determine at risk areas
Asbestos Abatement	571	Aug 90	Eliminated asbestos fibers in the facilities
Sudbury Reservoir Trt Plant Study and EIR	513	Sep 92	Evaluated alternatives uses of the Sudbury Reservoir
PCB Abatement	432	Aug 91	Replaced equipment with unacceptable levels of PCB concentrations
Echo Bridge Rehabilitation	357	Sep 92	Repaired and cleaned the bridge facade and constructed a new surface topping.

Project	Total Cost ($000)	Completion Date	Accomplishment
Cosgrove Intake Screens	317	Dec 87	Prevented debris from entering the aqueduct
Cosgrove Intake Turbine Repair	225	Jul 86	Allowed full resumption of generation of hydroelectric power
Municipal Toilet Replacement	128	Dec 90	Reduced water consumption
Air Release Valves	82	Apr 90	Removed excess air to maintain the carrying capacity of pipes
General Edwards Bridge Pipe Replacement	74	Nov 89	Repaired leaks of the pipe
Chestnut Hill Low Srvs Pumping Station	72	May 88	Repaired the front granite steps of the station
Northern Extra High Srvs - Bedford Pipeline	71	Jan 92	Developed a plan to supply water to Bedford
Dudley Rd. Pump Station	53	Jun 91	Evaluated the feasibility of pump station rehabilitation
Ward St. Pump Station	33	Aug 89	Evaluated the feasibility of pump station rehabilitation
Blue Hills Reservoir Cover - Quincy	31	Dec 86	Identified solutions to a seagull contamination problem
Instrumentation Telemetry	24	Sep 86	Developed a future operation plan of the distribution system
Wachusett Reservoir By-pass Tunnel	15	Jan 89	Evaluated the option of constructing a tunnel bypass
TOTAL WATERWORKS SYSTEM IMPROVEMENTS	**$66,273**		

BUSINESS AND OPERATIONS SUPPORT

Project	Total Cost ($000)	Completion Date	Accomplishment
Management Information System	24,325	Dec 92	Enhanced the professional management of MWRA affairs
Charlestown Headquarters	7,413	Jun 91	Improved office equipment at MWRA headquarters

Radio Communications System	1,000	Sep 89	Enhanced communication among geographically dispersed facilities & mobile work crews
MWRA Mitigation Program	475	Oct 88	Reduced construction impacts of the D.I. improvements in Winthrop
Vehicle Maintenance Garage	412	Mar 89	Improved management & maintenance control of the vehicle fleet
Affirmative Action Study	403	Mar 91	Evaluated minority participation in the MWRA procurement process
Engineering Feasibility Study	249	Jun 89	Evaluated the integrity of the water and wastewater systems
Permanent Headquarters	161	Jan 87	Examined options for possible relocation of permanent office space
TOTAL: BUSINESS AND OPERATIONS SUPPORT	**$34,438**		

BOSTON HARBOR PROJECT COMPLETED CONSTRUCTION CONTRACTS

DI Primary & Secondary Treatment Facilities

CP #	*CONTRACT NAME*	*COMP. DATE*	*CONTRACT VALUE (000's)*	*ACCOMPLISHMENT*
020	*Asbestos Removal Fort Dawes-Steam Pumping Station*	*Jan - 90*	*$518*	*Removal and disposal of asbestos in buildings for demolition.*
021	*Demolition Fort Dawes Bunkers*	*Apr - 90*	*$4,617*	*Removal and disposal of hazardous materials in bunkers for demolition.*
022	*Earthwork/Landfill/Roadways*	*Nov - 91*	*$17,107*	*Built platforms for treatment plant and landforms to shield Winthrop from the plant.*
023	*Pumping Station Modifications and Sewers*	*Nov - 90*	*$5,713*	*Modifications to protect outfall conduit from excessive load damage*
024	*Administration/Laboratory; Maintenance/ Warehouse Buildings*	*Dec - 94*	*$48,921*	*Construction of a building to support DI Staff including Process Control, TRAC, Harbor Studies, Combined Sewer Overflow, Infiltration/Inflow, & NPDES.*
027	*Maintenance Shops Facility I*	*Apr - 92*	*$395*	*Temporary storage facility and vehicle maintenance facility*
028	*Maintenance Shops Facility II*	*Sep - 92*	*$1,970*	

CP #	*CONTRACT NAME*	*COMP. DATE*	*CONTRACT VALUE (000's)*	*ACCOMPLISHMENT*
030	*Disposal of Excess Till*	*Dec - 91*	*$14,137*	*Excavation and off-island disposal of 1.1 million cubic yards of drumlin material.*
040	*DI Prison Demolition/Late Drumlin Excavation*	*Jun - 94*	*$16,758*	*Demolition of prison to clear location for Secondary Clarifier Batteries A and B.*
049	*Hazardous Material Remediation (1991-1994)*	*Jun - 94*	*$7,433*	*Investigation and remediation of existing hazardous material on Deer Island.*
050	*Hazardous Material II (1994-1996)*	*Apr - 96*	*$1,660*	
	Nut Island Headworks Equipment	*Mar - 92*	*$347*	*Purchase of a diesel generator to Provide back-up power supply to existing plant and permanent supply to new plant.*
101	*North System Tunnel*	*Jul - 92*	*$20,622*	*Construction of two 11.5 ft diameter tunnels to carry North Collection System Flows from the North Main Pump Station and the Winthrop Terminal Facility to the new North System Headworks facility.*
103	*North System Headworks*	*Dec - 94*	*$96,096*	*Construction of a grit removal facility, a primary pretreatment gallery, a primary treatment control building, and two older control facilities.*
105	*Primary Clarifier Batteries A & B*	*Dec - 94*	*$100,570*	*Construction of two batteries for primary treatment, each with 12 stacked clarifiers.*
130	*Primary Clarifier Batteries C & D*	*Jul - 95*	*$84,379*	*Construction of the two remaining batteries (C and D) for primary treatment, each with 12 stacked clarifiers.*
201	*Permanent Pilot Plant*	*Sept - 94*	*$11,942*	*Pilot testing program to refine the design of Deer Island facilities which includes the operation of a trailer-mounted oxygen activated sludge treatment unit, hydraulic model testing of stacked clarifier configurations, full-scale primary & secondary oxygen-activated sludge pilot facility with stacked clarifiers.*

CP #	CONTRACT NAME	COMP. DATE	CONTRACT VALUE (000's)	ACCOMPLISHMENT
205	*Deer Island Water Storage Tank*	*Oct - 94*	*$9,061*	*Construction of a two million gallon water tank on northeast corner of Deer Island that connects to the Winthrop water main to supply the plant-wide water distribution system.*
283	*Effluent Outfall Diffusers*	*Nov - 92*	*$77,088*	*Purchase and installation of riser and diffuser shafts and drilling of riser shafts.*
285	*Tunnel Muck Processing and Disposal*	*Nov - 94*	*$14,449*	*First phase to process muck from Effluent Outfall tunnel for reuse as backfill and other purposes.*
301	*Residual Treatment Facilities Phase I Primary Batteries A, B, C, & D*	*Dec - 95*	*$213,717*	*Construction of a gravity thickener complex and associated facilities to thicken primary sludge.*
401	*Off-Island Water Line*	*Nov - 95*	*$16,174*	*Construction of a three-mile water supply line through Winthrop to Deer Island.*
427/ 402	*Main 13.8kv Switchgear Building and Distribution System/Yard Utilities*	*Jan - 95*	*$21,245*	*Provision of main switchgear equipment and construction of the main switchgear building.*
	Interim Transformer Switchgear	*May - 90*	*$216*	*Power supply for construction and backup power source for the existing treatment plant.*
431	*BECO*	*May - 95*	*$34,365*	*Provision of combustion turbine generators to meet back-up electric power needs on D.I.*
	Construction Water	*Jan - 95*	*$1,997*	*Provision of water needed on D.I.*
805	*Interim Sludge Transfer Facility*	*Sep - 91*	*$4,514*	*Built facility to store digested sludge from the existing plant and pump the sludge to barges for transport and processing at FRSA.*
901	*Construction Support Building*	*Jul - 91*	*$4,067*	*Construction of building by pier that provides a waiting area, medical facilities, and work area for CM staff.*

CP #	CONTRACT NAME	COMP. DATE	CONTRACT VALUE (000's)	ACCOMPLISHMENT
902	Construction Utilities, Roads, etc.	Jan - 92	$5,153	Development of a temporary water system; Installation of an electrical distribution system; Construction of temporary roadways; Provision of temporary toilets, wheel wash station, trash handling facility and utility buildings.
903	Fuel Facility	Sep - 91	$1,665	Construction of fuel tanks, pipeline, and dispensing facilities for daily fuel for Deer Island equipment and machinery.
904	Fuel Supplier 1 (1990-1992)	May - 92	$126	Provision of fuel for construction equipment and vehicles on Deer Island from an interim fuel facility.
909	Security I (1988-1990)	Oct - 90	$198	Developement of a centralized security system including equipment and supplies.
917	Security II (1990-1992)	Dec - 92	$1,196	
930	Security III (1992-1994)	Dec - 94	$1,233	
910	Site and Fore River Staging Area Maintenance I	Nov - 92	$1,898	Provision of long term maintenance of construction roadways and sanitary facilities on Deer Island.
931	Site and Fore River Staging Area Maintenance II	Nov - 94	$2,476	
911	Trash Handling and Disposal I (1990-1993)	Jul - 93	$852	Collection and disposal of solid waste for all contractors at an approved site.
933	Trash Handling and Disposal II (1993-1995)	Jun - 95	$954	
912	Off-Site Maintenance and CSB Housekeeping I	Jan - 93	$205	Provision of initial janitorial services, general clean-up and landscape maintenance for off-site facilities that support construction at Deer Island.
934	Off-Site Maintenance and CSB Housekeeping II	Feb - 95	$315	
913	Rodent Control (1989-1991)	Jul - 91	$34	Performance of a comprehensive rodent control program on Deer Island.
919	Rodent Control II (1991-1995)	Sep - 95	$133	

CP #	*CONTRACT NAME*	*COMP. DATE*	*CONTRACT VALUE (000's)*	*ACCOMPLISHMENT*
922	*Off-Site Snow Related Services*	*Nov - 92*	*$134*	*Provision of road/parking lot snow service and asphalt sweeping for off-site facilities that support construction at Deer Island and Nut Island.*
932	*Off-Site Snow Related Services/Asphalt Sweeping II*	*Dec - 94*	*$589*	
950	*Construction Support Labor I (1991-1992)*	*Aug - 92*	*$735*	*Provision of construction, reconstruction, renovation, reconditioning, installation, repair, and testing of construction support facilities and systems.*
951	*Construction Support Labor II (1992-1993)*	*Jul - 93*	*$3,992*	
952	*Construction Support Labor III*	*Jul - 95*	*$5,855*	
960	*Construction Support Labor - Electrical (1993-1995)*	*Jun - 95*	*$909*	*Provision of electrical installation, repair, and testing of construction support facilities and systems.*
962	*Construction Support Labor - HVAC*	*Apr - 96*	*$429*	*Provision of HVAC work required due to construction on Deer Island.*

Water Transportation

CP#	*CONTRACT NAME*	*COMP. DATE*	*CONTRACT VALUE (000's)*	*ACCOMPLISHMENT*
001	*Marine Facilities at Deer Island*	*Feb - 90*	*$27,694*	*Construction of roll on/roll off piers, bulk cargo piers, and a personnel transport pier.*
002	*On-Shore Marine Facility Quincy*	*Apr - 90*	*$6,966*	*Construction of roll on/roll off piers at FRSA with two 110 foot transfer bridges.*
005	*Squantum Point Pier (Dredging)*	*Feb - 90*	*$417*	*Completion of the dredging of channel necessary at Squantum Point Pier in Quincy.*
007	*Bus Terminal and Parking Facility at Suffolk Downs*	*May - 91*	*$341*	*Improvements to the land transport system at the Suffolk Downs site in order to facilitate bus operations.*

CP#	CONTRACT NAME	COMP. DATE	CONTRACT VALUE (000's)	ACCOMPLISHMENT
009	*Charlestown Demolition, Rehabilitation, and Ferry Terminal*	*Aug - 92*	*$2,443*	*Lease and rehabilitation of site including demolition of on-site buildings, and subsequent additions including parking, drainage, and safety improvements.*
	Asbestos-Revere Sugar *Revere Sugar Lease*	*Dec - 91* *Oct - 94*	*$483* *$2,234*	*Lease and removal of asbestos of Revere Sugar Facility.*
010	*Asbestos and Electric Cable Removal FRSA*	*Jul - 90*	*$423*	*Removal of asbestos in buildings for modification and rehabilitation at FRSA.*
011	*Demolition at FRSA*	*Aug - 90*	*$240*	*Demolition of approximately 20 buildings and upgrade of an additional 17 for construction of storage area.*
012	*Marine and On-Shore Facilities FRSA*	*Jul - 92*	*$5,770*	*Construction of on-shore storage and lay down area to facilitate the transportation of materials and equipment to Deer Island.*
013	*Squantum Point Pier (Marine Construction)*	*Jul - 90*	*$1,642*	*Construction of marine facilities at Squantum Point Pier in Quincy.*
014	*Upland Facility/Personnel Ferry Terminal Squantum*	*May - 91*	*$1,960*	*Construction of a facility to support ferry service to transport workers from Squantum Point in Quincy including a pier, gangway, and floats.*
015	*Nut Island Dredging*	*Feb -91*	*$217*	*Completion of dredging to allow enough space for barges to transport sludge from Nut Island to Fore River Pelletization Facility until the Nut Island Treatment Plant is decommissioned.*
016	*Squantum Point Intersection Improvements*	*Jun - 94*	*$1,049*	*Improvements to intersections at Squantum Point to minimize the impact of increased traffic.*
150	*Marine Facility at Nut Island*	*Mar - 90*	*$5,393*	*Provision of materials loading and off-loading for barges arriving from Fore River.*
941	*Revere Sugar Facility Support*	*Oct - 94*	*$0*	*Provision of overhead and labor to support personnel ferry operations at the Revere Sugar Personnel Ferry Terminal in Charlestown.*

SOURCE OF FUNDS ($000)

	State Construction Grant Fund	Federal Construction Grant Fund	Special Federal Grants	State Revolving Loan Fund	Other	Bonds/Cash Financing	TOTAL
WASTEWATER							
Quincy Pump Facilities				$1,979		$21,638	$23,617
Braintree-Weymouth Relief	48	240				138,627	138,915
New Neponset Valley Relief	887			23,300		7,247	31,434
Upper Neponset Valley Relief						2,998	2,998
Wellesley Extension Sewer	30,115	18,955				23,446	72,516
Framingham Extension Sewer	1,142			16,569		29,608	47,319
Cummingsville Replacement Sewer						4,239	4,239
North Metropolitan Trunk Sewer				9,025		4,451	13,476
Siphon Structure Rehab.						5,480	5,480
Wastewater Metering						500	500
Ashland Extension Sewer						1,005	1,005
System Master Plan Interceptors						18,798	18,798
Corrosion and Odor Control Study						685	685
Wastewater Facil. Rehabilitation						3,264	3,264
West Roxbury Tunnel						215	215
Wastewater Central Monitoring						600	600
Remote Headworks Rehab.						3,454	3,454
BHP Performance Certification						1,500	1,500
Deer Island Primary & Secondary	9,657		623,994	311,945		2,099,047	3,044,643
Water Transportation Facilities	20,410	12,994	5,054	17,049		194,614	250,121
As Needed Design/CS/RI						500	500
Construction Services						1,500	1,500
On-Site Generation of Sodium Hypo						16,650	16,650
DI Coastal Protection							0
DI Plant Wide System						250	250
Clinton Landfill Liner Repair						400	400
Residuals Management Facilities			17,896			38,240	56,136
CSOs	1,122		1,370	4,640		445,576	452,708
Infiltration/Inflow Local Assist.						15,937	15,937
WATERWORKS SYSTEM IMPROVEMENTS							
Walnut Hill Water Treatment Plant						$406,550	$406,550
Quabbin Water Treatment Plant						4,589	4,589
Watershed Protection						8,601	8,601
Norumbega Covered Storage						105,673	105,673
Nash Hill Covered Storage						14,376	14,376
Blue Hills Covered Storage						26,410	26,410
Bear Hill Covered Storage						5,161	5,161
Fells Covered Storage						17,989	17,989
Metrowest Tunnel	24					634,849	634,849
Dam Control Valve Replacement						1,842	1,842
Sluice Gate Rehabilitation						7,800	7,800
Metropolitan Tunnel Loop						208	208
Chicopee Valley Interconnections						3,953	3,953
Winsor Dam Hydroelectric						81	81

APPENDIX B

SOURCE OF FUNDS ($000)

	State Construction Grant Fund	Federal Construction Grant Fund	Special Federal Grants	State Revolving Loan Fund	Other	Bonds/Cash Financing	TOTAL
Valve Replacement						11,792	11,792
Cathodic Protection of Dist. Mains						215	215
Boston Low Service Pipe/Valve	114					22,588	22,588
WASM 1 & 2 Rehabilitation						35,132	35,132
Nonantum Rd. Pipe Replacement						2,111	2,111
Warren Cottage Line Rehab	36					1,519	1,519
Southern Service Improvements						13,762	13,762
Heath Hill Road Pipe Replacement						13,783	13,783
Southern Spine Distribution Mains	128					36,356	36,356
Southern Extra High-Secs 41, 42, & 74						7,753	7,753
Chestnut Hill Connecting Mains	66					11,063	11,063
Newton Service Improvements	36					7,442	7,442
Comm Avenue Pump Modernization						6,785	6,785
Lexington St. Pump Station Rehab						3,344	3,344
Rehab. of Other Pump Stations						9,899	9,899
Bear Hill Improvements - Sec 29 Rehab.	43					1,403	1,403
Spot Pond Pump Station Rehab.	33					32,785	32,785
Weston Aqueduct and Supply Main 4						38,061	38,061
Spot Pond Supply Mains-Rehab.	119					52,226	52,226
Northern Low Serv. Pipeline Replac.						1,827	1,827
Water Main Reloc-Chelsea River						5,052	5,052
Northern Low Service-Secs 8 & 57	24					10,649	10,649
Connecting Mains-Shaft 7-WASM 3	14					47,675	47,675
Northern High Serv.-Sec 26 Replace.						5,116	5,116
Northern High Serv.-Sec 91	38					7,436	7,436
Northern High Serv-Lynn Pipeline						14,013	14,013
Northern High Serv.-Sec 27 Improv.	14					2,814	2,814
Northern High Serv.-Revere/Malden						30,613	30,613
Northern High Serv.-Pipeline Rehab	14					14,033	14,033
Northern Extra High Service	52					3,125	3,125
Hydraulic Model Update						306	306
Central Monitoring System						12,509	12,509
Rehab of Existing Facilities						11,646	11,646
Distribution Systems Fac. Mapping						1,048	1,048
Local Water Infrastructure Rehab.						7,500	7,500
BUSINESS AND OPERATIONS SUPPORT							
North Maintenance Facilities						$18,008	$18,008
Fore River Staging Area						11,169	11,169
Technical Assistance Contracts						5,401	5,401
Business Systems Plan						4,677	4,677
TOTAL	$64,136	$32,189	$648,314	$384,507	$0	$4,841,187	$5,969,578

APPENDIX C

EXPECTED USEFUL LIFE OF CAPITAL PROJECTS

The estimated useful lives of MWRA's capital projects are summarized below:

Type of Capital Improvement	Estimated Useful Life (in years)
Study	5
Equipment	15
Cathodic Protection	15
Stop Planks	40
Control Valves	40
Pipeline	40
Relief Sewer	40
Pump Station	40
Wastewater Treatment Facilities	40
Water Treatment Facilities	50
Covered Storage Facilities	50
Tunnels	100

APPENDIX D

CAPITAL IMPROVEMENT PROGRAM DEVELOPMENT

Schedule and Process

MWRA is required to produce periodic revisions to its Capital Improvement Program (CIP) Budget. Development of the budget occurs in two cycles, first in proposed form, second in final form.

The first cycle entails review of existing capital projects and consideration of new project proposals. The cycle lasts from July to December and results in the proposed capital budget. MWRA is then directed by the Board of Directors to transmit the budget to the Advisory Board for a 60-day comprehensive review of the document. At the end of the review process, the Advisory Board submits formal comments and recommendations to the MWRA.

The second cycle, preparation of the final budget, begins in March. Upon completion of Advisory Board review, the divisions update project schedules, budgets, and expenditure forecasts for any new information which has become available since the proposed budget. During the month of May, a special committee of the Board of Directors holds a hearing on the proposed budget. The final document is prepared and submitted to the Board of Directors for final approval at the end of June. Upon approval, the budget becomes effective July 1st and remains in effect for one year.

A more detailed listing of CIP activities follows.

Developing the Capital Budget - Calendar of Activities

Month	Task
June	Rates and Budget Department distributes proposed budget forms, instructions, and diskettes to divisions.
July	Divisions submit new project proposals (Form 1s).
August	Divisions submit proposed budgets and expenditure forecasts to the Rates and Budget Department.
September	Rates and Budget Department meets with division staff to resolve new and expanded project issues.
	Rates and Budget Department prepares proposed budget comments and recommendations.

October	Executive Director reviews the projects and makes decisions.
	Rates and Budget Department (CIP & CEB) reviews updated Current Expense Budget impact sections.
	Rates and Budget Department and divisions finalize expenditure forecasts and schedules.
November	Analysts prepare revenue, grant, and debt service estimates.
	Divisions review draft project narratives.
December	Rates and Budget Department prepares proposed budget document.
	Rates and Budget Department submits proposed budget document to the Board of Directors for official transmittal to the Advisory Board.
January - February	Advisory Board reviews proposed budget.
	Rates and Budget Department staff, with assistance from divisions, respond to the Advisory Board's questions about proposed budget.
March	Advisory Board submits comments and recommendations to MWRA.
	Rates and Budget Department reviews the Advisory Board's recommendations with divisions to develop MWRA's response and to discuss possible budget changes.
	Rates and Budget Department distributes final budget forms, instructions, and diskettes to divisions for CIP update.
April-May	Board of Directors conduct hearings on proposed budget.
	Rates and Budget Department, with assistance from Divisions, develops MWRA's final response to the Advisory Board's recommendations.
	Divisions incorporate final recommendations into CIP update.
	Divisions return completed forms and diskettes for the CIP update.
June	Board of Directors review and approve MWRA's formal response to the Advisory Board's recommendations on proposed budget.

MWRA distributes official response to the Advisory Board's comments and recommendations.

Board of Directors review and approve final budget document.

B. Proposed CIP Preparation

Each division is required to submit proposals for each existing capital project, new capital projects, and equipment requests to be considered for inclusion in the proposed Capital Improvement Program. Proposals for new capital projects are considered once a year during the preparation of the proposed CIP. The only exception to this rule is acceptance of a new project proposal that requires a commitment of resources during that fiscal year.

There are four major goals to be met to ensure that the budget document is accurate. The first goal involves writing a narrative section which describes and justifies the project and articulates the public benefit derived from the proposed capital investment. In general, this goal has been met for existing projects. However, the project descriptions must be continually updated to include any changes in project scope.

The second goal consists of a continuing effort to improve project schedules. Project planning involves developing data on individual milestones and tasks required to carry out each project phase, and should also identify the staff resources necessary to carry out each task. Detailed project planning will not only be used to establish project schedules, but will also permit quarterly variance reporting of actual performance in comparison to planned progress for each capital project.

The third goal is to develop accurate cost estimates in current dollars for all phases with particular attention given to large construction phases. New cost estimates should be obtained from the consultant at regular intervals during the design process. These estimates will be incorporated into the budget document. In order to ensure the accuracy of in-house and consultant cost projections, detailed cost estimates should be supplied to the Rates and Budget Department in support of the budget amount.

The fourth goal involves the continuing effort to improve the accuracy of capital expenditure projections. Every effort should be made to project the probable sequence of construction tasks, and make allowances for winter construction. In addition, project managers should request the contractor's cashflow and use this in drafting the expenditure projections for awarded contracts.

The CIP update process also has secondary goals which include comprehensive identification of all phases of a capital project that will result in a contract, greater accuracy in the estimation of operations and maintenance costs for new capital facilities, and greater precision in predicting grant revenue.

CAPITAL BUDGETING POLICIES AND PROCEDURES

These policies and procedures govern capital budgeting and management practices at the Massachusetts Water Resources Authority. Deviations from policy, if any, will be reported to the MWRA's Board of Directors. Policies and procedures may be amended from time to time, provided that changes in provisions governing reporting to or approvals by the Board of Directors or the Advisory Board must be approved by the Board of Directors.

CAPITALIZATION POLICY

It is the policy of the MWRA that capitalization of expenditures be in conformance with generally accepted accounting principles. Under such guidelines, the MWRA has adopted the provision of the Financial Accounting Standards Board's Statement No. 71, "Accounting for the Effects of Certain Types of Regulation," to provide a better matching of revenues and expenses. Capital expenditures are intended to create assets or extend their useful lives. Assets are valued at their cost and provide benefits over an extended period of time. Sources of funds for capital expenditures include grants and loans, proceeds of Authority borrowing, and current revenue.

Asset value created by the Authority is of two kinds. One is the value of tangible assets either created or increased through Authority capital investments. Such assets include land, buildings, plant, equipment, and the system infrastructure for water and wastewater. The cost of such fixed asset investment includes not only purchase, rehabilitation, or construction cost, but also ancillary expenses necessary to make productive use of the asset. Ancillary costs can include, but are not limited to, costs for planning studies, professional fees, transportation charges, site preparation expenditures, and legal fees and claims directly attributable to the asset.

The second kind of asset value created by Authority investment is the value of intangible assets. While such investment does not result in tangible Authority assets, it does create a benefit to the Authority and its users over several years. Such assets include the cost of Authority efforts to establish base-line leak detection information for the water systems of MWRA customers. The cost of providing water consumption-limiting devices to households is another example.

Expenditures for tangible assets are included in the Capital Improvement Program and Budget if the expected cost of the individual asset or capital project is $100,000 or more and if the expected useful life is more than one year. Expenditures for intangible assets are capitalized if the expected benefit period is three years or more. Annually recurring costs and expenditures for maintenance of assets are not capitalized, even though their cost may exceed $100,000. Such recurring and maintenance costs include replacement of vehicles and computers, replacement of valves, and repair of interceptors and pipelines.

Renewal and Replacement Reserve

The renewal and replacement reserve has been established to fund a required capital improvement which is not provided for by monies otherwise available. Amounts may not be withdrawn until MWRA has specified the project to which the amount will be applied and its estimated cost and estimated completion date. It must also certify that such expenditure is reasonably required for the continued operation of the systems or for maintenance of revenues and that other provisions have not been made for funding such expenditures. Every three years, MWRA will receive recommendations from a consulting engineer as to the adequacy of the renewal and replacement reserve fund requirement.

CAPITAL BUDGET MANAGEMENT POLICIES AND PROCEDURES

Capital Budget Contingency

A contingency for each fiscal year is incorporated into the Capital Improvement Program for the purpose of providing funds for unanticipated or unpredictable costs associated with capital projects. Transfers from the contingency budget to the budget for a capital project phase can be made at any time during the fiscal year. Such transfers will occur automatically when the Executive Director authorizes either a contract award amount higher than the budgeted figure for the project phase, or change orders/contract amendments that result in costs higher than budgeted expenditures. If the contingency for the fiscal year has been exhausted, a budget amendment authorized by the Board of Directors is required to replenish it. A report on current and cumulative transfers from the contingency budget will be prepared monthly by the Rates and Budget Department.

Capital Budget Amendment

From time to time, it may be necessary to amend the Capital Expenditure Budget. Amendments are required when an unbudgeted capital project is proposed; a capital project budget, including all contingency transfers, has been exhausted by contract awards; or the contingency is to be replenished. In such cases, the Executive Director may recommend to the Board of Directors a budget amendment which can include new or higher amounts for individual projects or an additional contingency amount. The amendment will be submitted to the MWRA Advisory Board for review and comment for a period of 30 days. At the end of the 30 day period, the Board of Directors may take action on the budget amendment.

Capital Budget Monitoring and Reporting

The progress of capital projects is continually monitored for purposes of managerial control and decision-making and for financial planning and management. Each division is responsible for monitoring and reporting on the projects for which it is responsible, including explanations for both schedule and expenditure variances. Monitoring of revenue variances is a joint responsibility of grants management and budget staff. Monthly expenditure reports are distributed to divisions by the Rates and Budget Department.

Reports to the Executive Director on capital budget performance will be made quarterly. Two capital budget variance analysis reports will be provided to the Board of Directors, one for the first six months of a year and one at year end. The reports will include planned project schedules, revenues, and expenditures compared to actual performance. A schedule variance occurs when actual project schedules are three or more months behind or ahead of the planned timetable.

APPENDIX E
PRIORITIZATION OF CAPITAL PROJECTS
($000)

CIP #		TOTAL CONTRACT	PREVIOUS PAYMENTS	REMAINING BALANCE 06/30/97
	PRIORITY ONE: CRITICAL PROJECTS **Must be implemented immediately to continue service delivery at current levels.** **Must be implemented immediately to correct severe worker or public safety problems.** **Project leads to significant cost savings and rate relief.**			
1101	Quincy Pump Facilities (Squantum Force Main Ph 1&2	$6,722	$2,086	$4,636
2201	MetroWest Tunnel	634,849	83,070	551,779
2323	Spot Pond Pump Station Rehabilitation (Suction / Dist. Pipe & Pump Station)	32,785	24,069	8,716
	Total Priority One	**$674,356**	**$109,225**	**$565,131**
	PRIORITY TWO: ESSENTIAL PROJECTS **Must be implemented within a court-ordered schedule.**			
1202	Boston Harbor Project Performance Certification	$1,500	$405	$1,095
1204	DI Primary and Secondary Treatment Facilities	3,044,643	2,638,526	406,117
1205	Water Transportation Facilities	250,121	225,741	24,380
1301	Residuals Management Facilities	56,136	33,980	22,156
1401	Combined Sewer Overflow (Planning) Program	35,882	31,706	4,176
2335	Northern High Service Pipe Imprvmt - Revere/Malden	30,613	23,845	6,768
	Total Priority Two	**$3,418,895**	**$2,954,203**	**$464,692**
	PRIORITY THREE: NEEDED PROJECTS **Must be implemented within five years to keep systems in good repair and working condition at current levels of service.**			
1101	Quincy Pump Facilities (Quincy Force Main)	$1,795	$0	$1,795
1102	Braintree-Weymouth Relief Facilities	138,915	8,965	129,950
1103	New Neponset Valley Relief Sewer	31,434	30,861	573
1105	Wellesley Extension Sewer Replacement	72,516	64,790	7,726
1106	Framingham Extension Relief Sewer	47,319	27,325	19,994
1109	N. Metro. Trunk Sewer Rehab. Phase II	13,476	7,036	6,440
1110	Siphon Chamber & Diversion Structure Rehab.	5,480	564	4,916
1111	Wastewater Metering System Upgrade	500	500	0
1112	Ashland Extension Sewer	1,005	0	1,005
1113	System Master Plan Interceptors	18,798	0	18,798
1116	West Roxbury Tunnel	215	0	215
1201	Remote Headworks Rehabilitation	3,454	1,358	2,096
1206	D.I. As Needed Design/CS/RI	500	0	500
1207	D.I. Construction Services Contracts	1,500	0	1,500
1211	Clinton Landfill Liner Repair	400	0	400
2101	Walnut Hill Water Treatment Plant	406,550	14,564	391,986
2102	Quabbin Water Treatment Plant	4,589	546	4,043
2105	Norumbega Covered Storage	105,673	1,745	103,928
2106	Nash Hill Covered Storage	14,376	1,048	13,328
2307	Nonantum Road Pipe Rehabilitation	2,111	2,111	0
2309	Warren Cottage Line Rehabilitation	1,519	0	1,519
2310	Southern Service Improvements (Newton St. Pump)	3,829	3,153	676
2314	Southern Extra High - Sections 41 and 42	7,753	56	7,697
2318	Comm. Ave. Pump Station Modernization	6,785	1,429	5,356
2319	Lexington St. Pump Station Rehabilitation	3,344	2,814	530
2109	Fells Reservoir Covered Storage	17,989	4,707	13,282
2326	Northern Low Service Pipeline Replacement	1,827	221	1,606
2327	Water Main Relocation in Chelsea River Easement	5,052	47	5,005
2331	Northern High Service - Section 26 Revere	5,116	76	5,040
2332	Northern High Service - Connecting Mains to Sec. 91	7,436	390	7,046
2333	Northern High Service - Pipe Impmts Lynn Pipeline	14,013	11,724	2,289
2107	Winsor Dam Hydroelectric	81	0	81
2404	Local Water Infrastructure	7,500	0	7,500
3101	North Maintenance Facilities	18,008	517	17,491
	Total Priority Three	**$970,858**	**$186,547**	**$784,311**

APPENDIX E
PRIORITIZATION OF CAPITAL PROJECTS
($000)

PRIORITY FOUR: WORTHWHILE PROJECTS

Implementation beyond five years would not directly impair service delivery at current levels.
Implementation would improve current service levels.
Implementation of projects would enhance planning and management of the systems.
Implementation would improve community systems.

CIP #		TOTAL CONTRACT	PREVIOUS PAYMENTS	REMAINING BALANCE 06/30/97
1101	Quincy Pump Facilities Study (Pump Stations)	$15,100	$3,097	$12,003
1104	Upper Neponset Valley Relief Sewer	2,998	0	2,998
1107	Cummingsville Replacement Sewer	4,239	605	3,634
1114	Corrosion & Odor Control Study	685	313	372
1115	Wastewater Facilities Rehabilitation	3,264	0	3,264
1501	Infiltration/Inflow Local Financial Assistance Program	15,937	23,796	(7,859)
2104	Watershed Protection	8,601	2,101	6,500
2202	Dam Control Valve Replacement	1,842	1,072	770
2203	Sluice Gate Rehabilitation	7,800	3,951	3,849
2204	Metropolitan Tunnel Loop	208	0	208
2206	Chicopee Valley Aqueduct Interconnections	3,953	0	3,953
2302	Valve Replacement	11,792	1,145	10,647
2303	Cathodic Protection of Distribution Mains	215	113	102
2305	Boston Low Service and Valve Rehabilitation	22,588	1,697	20,891
2306	WASM 1 & 2 Rehabilitation	35,132	0	35,132
2310	Southern Service Imprvmnts (except Newton St. Pump)	9,933	5,278	4,655
2311	Heath Hill Pipe Replacement	13,783	1,859	11,924
2312	Southern Spine Distribution Mains	36,356	0	36,356
2107	Blue Hills Covered Storage	26,410	0	26,410
2315	Chestnut Hill Connecting Mains	11,063	0	11,063
2317	Newton Service Improvements	7,442	82	7,360
2320	Rehab. Study of Other Pump Stations	9,899	436	9,463
2321	Bear Hill Improvements - Section 29 Rehab.	1,403	0	1,403
2108	Bear Hill Covered Storage	5,161	0	5,161
2324	WASM 4	38,061	2,736	35,325
2325	Spot Pond Supply Mains - Rehab. & Replacement	52,226	0	52,226
2328	Northern Low Service Rehab. Sections 8 and 57	10,649	0	10,649
2329	New Conn. Mains - Shaft 7 to WASM 3	47,675	575	47,100
2334	Northern High Service Section 27	2,814	0	2,814
2336	Northern High Service Pipeline Rehabilitation	14,033	0	14,033
2337	Northern Extra High Service - New Pipelines	3,125	222	2,903
2338	Hydraulic Model Update	306	0	306
2401	Central Monitoring System Expansion	12,509	9,187	3,322
2402	Rehabilitation of Existing Facilities	11,646	3,677	7,969
2403	Distribution Systems Facility Mapping	1,048	487	561
3102	Fore River Staging Area	11,169	9,886	1,283
3103	Technical Assistance Contracts	5,401	0	5,401
1117	Wastewater Central Monitoring	600	0	600
1210	D.I. Plant Wide System Repairs	250	0	250
1208	On-Site Generation of Sodium Hypochlorite	16,650	0	16,650
1401	Combined Sewer Overflow Control Program (CSOs)	416,826	7,889	408,937
3104	Business Systems Plan	4,677	2,657	2,020
	Total Priority Four	$905,469	$82,861	$822,608
	TOTAL FOR ALL PROJECTS	$5,969,578	$3,332,836	$2,636,742
	Final Payments	167,588	167,653	(65)
	Capital Budget Contingency	282,329	0	282,329
	TOTAL	$6,419,495	$3,500,489	$2,919,006

APPENDIX F

GLOSSARY OF TERMS

Activated Sludge - the sludge that results when primary effluent is mixed with bacteria-laden sludge and then agitated and aerated to promote biological treatment.

Advanced Waste Treatment - wastewater treatment beyond the secondary or biological stage that includes the removal of nutrients such as phosphorus and nitrogen and the removal of a higher percentage of suspended solids and organic matter.

Aerobic - in the presence of oxygen.

Anaerobic - life or processes that require, or are not destroyed by, the absence of oxygen such as bacteria which digest sludge.

Ash - the inert material remaining after the combustion of wastewater sludge. It can be either wet or dry depending on combustion system design.

Bacteria - One-celled microscopic organisms commonly found in the soil that perform a variety of biological treatment processes.

Blow-off Valves - valves operated during pipeline repair to dewater and isolate a portion of the pipeline.

BOD (Biochemical Oxygen Demand) - an indicator of the amount of biodegradable contaminants in wastewater.

BWSC (Boston Water and Sewer Commission) - responsible for providing water and sewer services to the City of Boston.

CAC - Citizens Advisory Committee.

CADD - Computer Aided Drafting/Design

Capital Investment - development of a facility or other asset which adds to the long-term value of an organization.

Cathodic Protection - a form of corrosion protection which is particularly effective against galvanic corrosion. Galvanic corrosion occurs when pipe metal is in the presence of other metals while immersed in water. The interaction of these elements causes an electric current to flow away from the pipe, taking electrons with it and pitting the pipe as a result. Cathodic protection reverses the current thereby stopping the corrosion.

Centrifuge - machine that uses centrifugal force to separate substances of different densities and remove moisture.

Chloramination - process of adding chloramine to drinking water. Chloramine, a form of chlorine and ammonia, will be used as a secondary disenfectant because it lasts longer in the water than other primary disenfectants (i.e. chlorine or ozone).

CFM - (Cubic Feet per Minute) - a measure of the quantity of a liquid flowing through a pipe.

Clean Water Act of 1972 - passed by Congress to protect the water resources of the nation, promote cleanup efforts of polluted bodies of water, and encourage states to adopt water conservation measures. It also prohibits many environmentally unsound disposal methods that threaten to pollute the nation's water supplies.

Cleaning and Lining - cleaning and cement lining of unlined cast iron mains to improve hydraulic capacity and increase useful life.

Coliform Bacteria - bacteria used as indicators of pollution from human wastes.

Combustion - the process of burning wastewater treatment residuals to remove water and reduce the remaining residues to a safe, nonburnable ash.

Comminutor - a machine or process which pulverizes and reduces solids to minute particles.

Composting - the process of converting wastewater treatment residuals to a soil-like humus material often used in the horticultural industry. The process involves the aerobic breakdown of the residuals and the addition of sawdust or wood chips.

Cross-Connection - a point at which potable water piping is connected to a non-potable water source creating an opportunity for introduction of pollutants into the potable water.

Cryptosporidium - a disease-causing parasite commonly found in lakes and rivers, especially when the water is contaminated with sewage and animal wastes.

CSO (Combined Sewer Overflow) - combined sewers in the metropolitan Boston area collect both sewage and storm water runoff for wastewater treatment. During rainstorms, the system becomes overloaded and the excess is discharged directly into Boston Harbor from Combined Sewer Overflow pipes. There are approximately 88 CSOs that discharge into the harbor.

Current Expense Budget Impact - the affect a project will have, upon completion and activation, on the current expense budget of the MWRA.

C-Value - the carrying capacity of a water main for a specified length and pressure drop is determined by its diameter and resistance to flow. The friction coefficient "C" of the main is often used as a measure of flow resistance. C-values for new pipe are about 120 for mains 6- to 16-inches in diameter, and 130 and 140 for larger diameters.

DEP (Department of Environmental Protection) - the Massachusetts agency that regulates water pollution control, water supplies, and waterways and dispenses federal and state grant funds to support these activities.

Dewatering - the process of removing water from wastewater treatment residuals. Dewatered sludge has the appearance of a mud or wet soil material.

Diffusers - a system of shafts, rising from the end of the effluent outfall tunnel to the seabed, that will disperse treated wastewater over a large area.

DIFP (Deer Island Facilities Plan) - the MWRA's plan to construct new facilities on Deer Island and to provide secondary treatment of wastewater generated by the 43 communities in the MWRA sewer area.

Digesters - tanks for the storage and anaerobic or aerobic decomposition of organic matter present in sludge.

Disinfection - the killing of water born fecal and pathogenic bacteria and viruses in potable water supplies or wastewater effluents with chlorine, sodium hypochlorite, or similar compounds.

Dissolved Oxygen (DO) - a measure of the amount of oxygen in a given amount of water. Adequate levels of DO are needed to support aquatic life. Low dissolved oxygen concentrations can result from inadequate waste treatment.

Dual Host Computer - coupled computer system consisting of two computer processing units (CPUs), one CPU running the main system and the second CPU providing back-up protection as well as running low level activities.

Effluent - treated wastewater discharged from a treatment plant.

EIR (Environmental Impact Report) - State process to review environmental impact and ensure public review.

EIS (Environmental Impact Statement) - Federal review process.

ENF (Environmental Notification Form) - the first step in the EIR process.

EOEA (Executive Office of Environmental Affairs) - the Massachusetts cabinet office overseeing all state environment agencies.

EPA (Environmental Protection Agency) - the federal government agency responsible for environmental enforcement and investigation.

Eutrophication - nutrient enrichment of a lake or other water body, typically characterized by increased growth of planktonic algae and rooted plants. It can be accelerated by wastewater discharges and polluted runoff.

Flash coat - a light coat of shotcrete used to cover minor blemishes on a concrete surface.

Force Main - a pressure pipe joining the pump discharge at a water or wastewater pumping station with a point of gravity flow.

Graphitization - corrosion mechanism which alters the molecular structure of the carbon/iron matrix of cast iron pipe. During the process, iron atoms are forced away from the metal leaving behind an unstable carbon matrix. The result is a weakened pipe, easily susceptible to ruptures. High frequency in the number of breaks has caused leakage to be a major problem of graphitized pipe.

Grit - sand-like materials that quickly settle out of wastewater.

Groundwater - the body of water beneath the surface of the ground. It is made up primarily of water that has seeped down from the surface.

Head House - a structure containing the control gates to a conduit such as a sewer pipeline.

Headworks - a preliminary treatment device or structure, usually involving a screening and degritting operation, that removes large or heavy materials (such as logs and sand) from wastewater prior to primary treatment.

Heavy Metals - metals that can be precipitated by hydrogen sulfide in acid solution, for example, lead, silver, gold mercury, bismuth, and copper.

Incineration - see combustion.

Infiltration/Inflow - the means by which groundwater and surface water enters sewer pipes and results in treatment of unnecessarily large wastewater volumes. Infiltration is groundwater that leaks into the sewerage system through pipe joints and defects. Inflow is primarily a wet-weather phenomenon and refers to water that enters sanitary sewers from improperly connected catch basins, sump pumps, roof leaders, land and basement drains, and defective manholes and tidegates.

Influent - the flow of water that enters the wastewater treatment process.

Interceptors - the large pipes that convey wastewater from the collection system to the treatment plant.

Land Application - the use of wastewater treatment residuals on land for agricultural benefits.

Landfilling - the disposal of residuals by burial. Modern landfills have double liners, leachate collection systems, and other design features to protect against groundwater contamination.

Leachate - water that drains from a landfill after having been in contact with, and potentially contaminated by, buried residuals. Modern landfills are designed to collect leachate for subsequent treatment.

Limnology - the scientific study of physical, chemical, meteorological, and biological conditions in fresh waters.

Mapping Protocols - sets of specifications defining the content and format of data to be collected.

MDC (Metropolitan District Commission) - prior to 1985, the agency responsible for water and sewer services in metropolitan Boston, a responsibility the MWRA assumed in July 1985. The MDC continues to oversee and manage parks and recreational areas, roadways in the metropolitan area, and the Quabbin Reservoir.

MEPA (Massachusetts Environmental Policy Act) - the MEPA Unit is the state office that oversees the EIR process.

Methane - a colorless, nonpoisonous, flammable gas produced as a byproduct of anaerobic sludge processing.

MGD - Million Gallons per Day

Mitigation - includes: (a) avoiding the impact altogether by not taking a certain action, (b) minimizing impacts by limiting the magnitude of the action, © rectifying the impact by repairing, rehabilitating, or restoring the impacted area, (d) preventing an impact by preservation and maintenance operations, and (e) compensating for an impact by replacing or providing substitute resources or environments.

MWRA (Massachusetts Water Resources Authority) - an independent, regional authority responsible for providing sewer and wastewater treatment services to 43 communities in the metropolitan Boston area and water services for 45 communities in the region. Central objectives of the Authority include cleaning up Boston Harbor, constructing new wastewater treatment facilities, improving the existing infrastructure, supplying adequate amounts of pure water, and promoting water conservation.

NPDES (National Pollutant Discharge Elimination System) - a permit issued by EPA in conjunction with DEP to govern discharges into waterways.

Operation and Maintenance (O&M) - the organized procedure for causing a piece of equipment or a treatment plant to perform its intended function and for keeping the equipment or plant in such condition that it is able continually and reliably to perform its intended function.

Organic Matter - material containing carbon, the cornerstone of plant and animal life. It originates from domestic and industrial sources.

Outfall - the place where effluent is discharged into receiving waters.

Plume - the rising discharge of treated effluent from a treatment plant outfall pipe.

Pretreatment - reduction or elimination of pollutant properties in wastewater prior to discharging the wastewater into a sewer system.

Privatization - the use of private contractors to perform tasks that customarily are the responsibility of government agencies.

Preliminary Treatment - the process of removing large solid objects, sticks, gravel, and grit from wastewater.

Primary Treatment - wastewater treatment afforded by sedimentation. It results in 50-60% removal of suspended solids and 30-34% removal of BOD.

Pumping Station - mechanical devices installed to push the sewage to a higher elevation.

Residuals - the by-products of the sewage treatment process, including scum (floatables), grit and screenings, primary sludge, and secondary sludge.

RMFP (Residuals Management Facilities Plan) - the MWRA's plan for the management of all residuals generated at wastewater treatment facilities in the MWRA service area.

Relief Sewer - a sewer built to carry the flows in excess of the capacity of an existing sewer.

Remote Headworks - the initial structures and devices of a treatment plant set apart by some distance from the plant site.

Safe Yield Model - the equation used to determine the maximum dependable draft that can be made continuously on a source of supply during a period of years during which the probable driest period or period of greatest deficiency in water supply is likely to occur.

Sanitary Sewers - in a separate system, pipes that carry only domestic wastewater.

Screenings - large items, such as wood and rags, that are collected from wastewater in coarse screens prior to primary treatment.

Scum - floatable materials such as grease, oil, and plastics that are skimmed from the surface of wastewater as it flows through large settling tanks.

Secondary Treatment - usually follows primary treatment. It employs microorganisms to further reduce the level of BOD in wastewater. Together, primary and secondary treatment result in an 85% reduction of both BOD and suspended solids.

Sedimentation Tanks - settling tanks which facilitate the removal of solids from sewage. The wastewater is pumped to the tanks where the solids settle to the bottom or float on the top as scum. The scum is skimmed off the top, and solids on the bottom are pumped out for further treatment and/or final disposal.

Septic Tanks - used for domestic wastes when a sewer line is not available to carry them to a treatment plant. Periodically, the septage is pumped out of the tanks, usually by commercial firms, and released into a wastewater treatment system.

Sewer Jet Truck - vehicle used to clean and/or remove blockages from sewer lines by pushing fluids in the sewer.

Shotcrete - mortar or concrete conveyed through a hose and projected at high velocity onto a surface; also known as air-blown mortar, pneumatically applied sprayed mortar, or gunned concrete.

Siphon - a closed conduit, a portion of which lies above the hydraulic grade line, resulting in a pressure less than atmospheric and requiring a vacuum within the conduit to start flow. A siphon utilizes atmospheric pressure to effect or increase the flow of water through the conduit.

Slip Lining - insertion by pushing or pulling of lines fabricated of plastic, concrete cylinder pipe, reinforced concrete, or steel through existing conduits from access pits.

Sludge - material removed by sedimentation during primary and secondary treatment. It includes both settled particulate matter and microorganisms and is the single largest component of wastewater residuals. At the time sludge is removed during the treatment process, it contains only .5% to 5% solid content by weight. It has the appearance of muddy water.

Sodium Hypochlorite (NaOCl) - primary chemical used in the disinfection and odor processes at the Deer Island Treatment Plant.

STFP - Secondary Treatment Facilities Plan, also known as the Deer Island Facilities Plan (see DIFP).

Storm Sewers - separate systems of pipes that carry only water runoffs from roofs, streets, and parking lots during storms.

Surcharging - loads on a system beyond those normally anticipated; the height of wastewater in a sewer manhole above the crown of the sewer when the sewer is flowing completely full.

Suspended Solids - the particulate matter contained in wastewater.

Telemetry - remote measuring or monitoring devices connected to a central monitoring station via telephone lines.

Transition - a short section of conduit used as a conversion section to unite two conduits having different hydraulic elements.

Underdrain Outlets - outlets from a drain that carry away groundwater or the drainage from prepared beds to which water or wastewater has been applied.

United States Geological Survey (USGS) - agency which collects Geographic Information System (GIS) data for developing mapping protocols.

Vactor Jet Truck - vehicle used to clean and/or remove blockages from sewer lines by pushing and/or pulling fluids in the sewer.

Wastewater - the water carried by sewers serving residences and businesses that enters wastewater facilities for treatment.

Wastewater Treatment Plan (WTP) - a series of tanks, screens, filters, and other equipment and processes for removing pollutants from wastewater.

APPENDIX G
CITY, TOWN/PROJECT

City or Town Project Number	Project
All MWRA Customers	
3101	North Maintenance Facilities
3102	Fore River Staging Area
3103	Technical Assistance Contracts
3104	Business Systems Plan
All Wastewater Customers	
1110	Siphon Chamber & Diversion Structure Rehab.
1114	Corrosion and Odor Control Study
1115	Wastewater Facilities Rehabilitation
1117	Wastewater Central Monitoring
1201	Deer Island Treatment Plant and Related Projects
1206	DI As-Needed Design/CS/RI
1207	DI Construction Services Contracts
1208	On-Site Generation of Sodium Hypochlorite
1209	DI Coastal Protection
1210	DI Plant-Wide Systems
1301	Residuals Management Facilities
1501	Infiltration/Inflow Local Financial Assistance Program
All Water Customers	
2202	Dam Control Valve Replacement
2203	Sluice Gate Rehabilitation
2207	Winsor Dam Hydroelectric
2302	Valve Replacement
2303	Cathodic Protection of Distribution Mains
2401	Central Monitoring System
2402	Rehabilitation of Existing Facilities
2403	Distribution Systems Facilities Mapping
All Water Customers (Except South Hadley, Chicopee, Wilbraham, Worcester, Clinton, and Leominster)	
2101	Walnut Hill Treatment Plant
2201	MetroWest Tunnel
Arlington	
1108	Alewife Brook Parkway Pump St. Rehab.
1111	Wastewater Metering System Upgrade
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2320	Rehabilitation of Other Pump Stations
2325	Spot Pond Supply Mains
2329	New Connecting Mains - Shaft 7 to WASM 3
2337	Northern Extra High Service - New Pipelines
Ashland	
1106	Framingham Extension Relief Sewer
1111	Wastewater Metering System Upgrade
1112	Ashland Extension Sewer
1116	West Roxbury Tunnel
Bedford	
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2320	Rehabilitation of Other Pump Stations
2329	New Connecting Mains - Shaft 7 to WASM 3
Bedford (Continued)	
1201	Remote Headworks Rehabilitation
2337	Northern Extra High Service - New Pipelines
Belmont	
1108	Alewife Brook Parkway Pump St. Rehab.
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2320	Rehabilitation of Other Pump Stations
2329	New Connecting Mains - Shaft 7 to WASM 3
Boston	
1116	West Roxbury Tunnel
1201	Remote Headworks Rehabilitation
1401	Combined Sewer Overflow Control Program
2105	Norumbega Covered Storage
2107	Blue Hills Covered Storage
2204	Metropolitan Tunnel Loop
2305	Boston Low Service Pipe and Valve Rehab.
2306	WASM 1 and 2 Rehabilitation
2307	Nonantum Road Pipe Rehabilitation
2309	Warren Cottage Line Rehabilitation
2310	Southern Service Improvements
2311	Heath Hill Pipe Replacement
2312	Southern Spine Distribution Mains
2314	Southern Extra High - Sections 41 and 42
2315	Chestnut Hill Connecting Mains
2320	Rehabilitation of Other Pump Stations
2324	WASM 4
2325	Spot Pond Supply Mains
2329	New Connecting Mains - Shaft 7 to WASM 3
Braintree	
1102	Braintree-Weymouth Relief Facilities
1111	Wastewater Metering System Upgrade
Brighton	
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
Brookline	
1104	Upper Neponset Valley Relief Sewer
1111	Wastewater Metering System Upgrade
1116	West Roxbury Tunnel
1201	Remote Headworks Rehabilitation
2305	Boston Low Service Pipe and Valve Rehab.
2309	Warren Cottage Line Rehabilitation
2310	Southern Service Improvements
2311	Heath Hill Pipe Replacement
2312	Southern Spine Distribution Mains
2314	Southern Extra High - Sections 41 and 42
2315	Chestnut Hill Connecting Mains
2320	Rehabilitation of Other Pump Stations
Burlington	
1107	Cummingsville Replacement Sewer
1201	Remote Headworks Rehabilitation

APPENDIX G
CITY, TOWN/PROJECT

City or Town Project Number /	Project
Cambridge	
1108	Alewife Brook Parkway Pump St. Rehab.
1113	System Master Plan Inteceptors
1201	Remote Headworks Rehabilitation
1401	Combined Sewer Overflow Control Program
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2306	WASM 1 and 2 Rehabilitation
2307	Nonantum Road Pipe Rehabilitation
2324	WASM 4
2325	Spot Pond Supply Mains
Canton	
1103	New Neponset Valley Relief Sewer
1111	Wastewater Metering System Upgrade
2107	Blue Hills Covered Storage
2310	Southern Service Improvements
2312	Southern Spine Distribution Mains
2314	Southern Extra High - Sections 41 and 42
2320	Rehabilitation of Other Pump Stations
Chelsea	
1109	N. Metro. Trunk Sewer Rehab. Phase II
1111	Wastewater Metering System Upgrade
1113	System Master Plan
1201	Remote Headworks Rehabilitation
1401	Combined Sewer Overflow Control Program
2306	WASM 1 and 2 Rehabilitation
2325	Spot Pond Supply Mains
2326	Northern Low Service Pipeline Replacement
2328	Northern Low Service Rehab. - Sections 8 & 57
Chestnut Hill	
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
Chicopee	
2016	Nash Hill Covered Storage
2102	Quabbin Treatment Plant
2206	Chicopee Valley Aqueduct Interconnections
Clinton	
1211	Clinton Landfill Liner Repair
Dedham	
1103	New Neponset Valley Relief Sewer
1104	Upper Neponset Valley Relief Sewer
1105	Wellesley Extension Sewer Replacement
1113	System Master Plan Interceptors
1116	West Roxbury Tunnel
East Boston	
1109	N. Metro. Trunk Sewer Rehab. Phase II
2327	Water Main Relocation in Chelsea River
2328	Northern Low Service Rehab. - Sections 8 & 57
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation

City or Town Project Number /	Project
Everett	
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
2306	WASM 1 and 2 Rehabilitation
2325	Spot Pond Supply Mains
2326	Northern Low Service Pipeline Replacement
2328	Northern Low Service Rehab. - Sections 8 & 57
2336	Northern High Service Pipeline Rehabilitation
Framingham	
1106	Framingham Extension Relief Sewer
1116	West Roxbury Tunnel
2104	Sudbury Watershed Protection
Hingham	
1102	Braintree-Weymouth Relief Facilities
Holbrook	
1102	Braintree-Weymouth Relief Facilities
Hyde Park	
1103	New Neponset Valley Relief Sewer
Lancaster Sewer District	
1211	Clinton Landfill Liner Repair
Lexington	
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2320	Rehabilitation of Other Pump Stations
2329	New Connecting Mains - Shaft 7 to WASM 3
2337	Northern Extra High Service - New Pipelines
Lynn	
2323	Spot Pond Pump Station Rehabilitation
2331	Northern High Service - Section 26 Revere
2332	Northern High Service Connecting Mains to Sec. 91
2333	Northern High Service Pipe Impts - Lynn Pipeline
2334	Northern High Service Section 27
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Lynnfield	
2323	Spot Pond Pump Station Rehabilitation
2332	Northern High Service Connecting Mains to Sec. 91
Malden	
1111	Wastewater Metering System Upgrade
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2109	Fells Covered Storage
2204	Metropolitan Tunnel Loop
2306	WASM 1 and 2 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation
2325	Spot Pond Supply Mains
2328	Northern Low Service Rehab. - Sections 8 & 57
2335	Northern High Service Pipe Impts - Revere/Malden

APPENDIX G
CITY, TOWN/PROJECT

City or Town Project Number	/ Project
Marblehead	
2323	Spot Pond Pump Station Rehabilitation
2332	Northern High Service Connecting Mains to Sec. 91
2333	Northern High Service Pipe Impts - Lynn Pipeline
2334	Northern High Service Section 27
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Marlborough	
2104	Sudbury Watershed Protection
Medford	
1108	Alewife Brook Parkway Pump St. Rehab.
1111	Wastewater Metering System Upgrade
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2109	Fells Covered Storage
2204	Metropolitan Tunnel Loop
2306	WASM 1 and 2 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation
2325	Spot Pond Supply Mains
2326	Northern Low Service Pipeline Replacement
2328	Northern Low Service Rehab. - Sections 8 & 57
2329	New Connecting Mains - Shaft 7 to WASM 3
Melrose	
1201	Remote Headworks Rehabilitation
2109	Fells Covered Storage
2323	Spot Pond Pump Station Rehabilitation
Milton	
1103	New Neponset Valley Relief Sewer
1111	Wastewater Metering System Upgrade
1201	Remote Headworks Rehabilitation
2107	Blue Hills Covered Storage
2310	Southern Service Improvements
2312	Southern Spine Distribution Mains
2314	Southern Extra High - Sections 41 and 42
2320	Rehabilitation of Other Pump Stations
Nahant	
2323	Spot Pond Pump Station Rehabilitation
2332	Northern High Service Connecting Mains to Sec. 91
2333	Northern High Service Pipe Impts - Lynn Pipeline
2334	Northern High Service Section 27
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Natick	
1106	Framingham Extension Relief Sewer
1111	Wastewater Metering System Upgrade
1116	West Roxbury Tunnel
Needham	
1105	Wellesley Extension Sewer Replacement
1116	West Roxbury Tunnel
Newton	
1104	Upper Neponset Valley Relief Sewer
1201	Remote Headworks Rehabilitation
2307	Nonantum Road Pipe Rehabilitation
2315	Chestnut Hill Connecting Mains
2317	Newton Service Improvements
2318	Commonwealth Ave. Pump Station Modernization
2324	WASM 4
2329	New Connecting Mains - Shaft 7 to WASM 3
Norwood	
1103	New Neponset Valley Relief Sewer
2107	Blue Hills Covered Storage
2310	Southern Service Improvements
2312	Southern Spine Distribution Mains
2314	Southern Extra High - Sections 41 and 42
2320	Rehabilitation of Other Pump Stations
Peabody	
2323	Spot Pond Pump Station Rehabilitation
2333	Northern High Service Pipe Impts - Lynn Pipeline
2334	Northern High Service Section 27
2335	Northern High Service Pipe Impts - Revere/Malden
Quincy	
1101	Quincy Pump Facilities
1102	Braintree-Weymouth Relief Facilities
2107	Blue Hills Covered Storage
2310	Southern Service Improvements
2312	Southern Spine Distribution Mains
Randolph	
1102	Braintree-Weymouth Relief Facilities
Reading	
1201	Remote Headworks Rehabilitation
Revere	
1109	N. Metro. Trunk Sewer Rehab. Phase II
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
2306	WASM 1 and 2 Rehabilitation
2331	Northern High Service - Section 26 Revere
2332	Northern High Service Connecting Mains to Sec. 91
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Saugus	
2109	Fells Covered Storage
2323	Spot Pond Pump Station Rehabilitation
2331	Northern High Service - Section 26 Revere
2332	Northern High Service Connecting Mains to Sec. 91
2333	Northern High Service Pipe Impts - Lynn Pipeline
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Somerville	
1108	Alewife Brook Parkway Pump St. Rehab.
1111	Wastewater Metering System Upgrade
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
1401	Combined Sewer Overflow Control Program
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2306	WASM 1 and 2 Rehabilitation
2325	Spot Pond Supply Mains
2329	New Connecting Mains - Shaft 7 to WASM 3
South Hadley	
2016	Nash Hill Covered Storage
2102	Quabbin Treatment Plant
2206	Chicopee Valley Aqueduct Interconnections
Southborough	
2104	Sudbury Watershed Protection

APPENDIX G
CITY, TOWN/PROJECT

City or Town Project Number	Project
Stoneham	
1201	Remote Headworks Rehabilitation
2108	Bear Hill Covered Storage
2109	Fells Covered Storage
2321	Bear Hill Improvements - Section 29 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation
Stoughton	
1103	New Neponset Valley Relief Sewer
Swampscott	
2323	Spot Pond Pump Station Rehabilitation
2332	Northern High Service Connecting Mains to Sec. 91
2333	Northern High Service Pipe Impts - Lynn Pipeline
2334	Northern High Service Section 27
Wakefield	
1201	Remote Headworks Rehabilitation
2108	Bear Hill Covered Storage
2109	Fells Covered Storage
2321	Bear Hill Improvements - Section 29 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation
Walpole	
1103	New Neponset Valley Relief Sewer
Waltham	
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2319	Lexington St. Pump Station Rehabilitation
2320	Rehabilitation of Other Pump Stations
2329	New Connecting Mains - Shaft 7 to WASM 3
2337	Northern Extra High Service - New Pipelines
Watertown	
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
2307	Nonantum Road Pipe Rehabilitation
2320	Rehabilitation of Other Pump Stations
2324	WASM 4
2329	New Connecting Mains - Shaft 7 to WASM 3
Wellesley	
1105	Wellesley Extension Sewer Replacement
1111	Wastewater Metering System Upgrade
1116	West Roxbury Tunnel
West Roxbury	
1104	Upper Neponset Valley Relief Sewer
Weston	
2105	Norumbega Covered Storage
2204	Metropolitan Tunnel Loop
Westwood	
1103	New Neponset Valley Relief Sewer
Weymouth	
1102	Braintree-Weymouth Relief Facilities

City or Town Project Number	Project
Wilbraham	
2016	Nash Hill Covered Storage
2102	Quabbin Treatment Plant
2206	Chicopee Valley Aqueduct Interconnections
Wilmington	
1201	Remote Headworks Rehabilitation
Winchester	
1107	Cummingsville Replacement Sewer
1111	Wastewater Metering System Upgrade
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
2105	Norumbega Covered Storage
2108	Bear Hill Covered Storage
2204	Metropolitan Tunnel Loop
2320	Rehabilitation of Other Pump Stations
2321	Bear Hill Improvements - Section 29 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation
2329	New Connecting Mains - Shaft 7 to WASM 3
Winthrop	
1109	N. Metro. Trunk Sewer Rehab. Phase II
1111	Wastewater Metering System Upgrade
1201	Remote Headworks Rehabilitation
2335	Northern High Service Pipe Impts - Revere/Malden
2336	Northern High Service Pipeline Rehabilitation
Woburn	
1107	Cummingsville Branch Sewer
1113	System Master Plan Interceptors
1201	Remote Headworks Rehabilitation
2108	Bear Hill Covered Storage
2321	Bear Hill Improvements - Section 29 Rehabilitation
2323	Spot Pond Pump Station Rehabilitation

APPENDIX H
PROJECT/CITY, TOWN

Project Number / Project	Community(s) Affected
1101 Quincy Pump Facilities	Quincy
1102 Braintree-Weymouth Relief Facilities	Braintree Hingham Holbrook Randolph Weymouth Quincy
1103 New Neponset Valley Relief Sewer	Canton Dedham Hyde Park Milton Norwood Stoughton Walpole Westwood
1104 Upper Neponset Valley Relief Sewer	Brookline Dedham Newton West Roxbury
1105 Wellesley Extension Sewer Replacement	Dedham Needham Wellesley
1106 Framingham Extension Relief Sewer	Ashland Framingham Natick
1107 Cummingsville Replacement Sewer	Burlington Winchester Woburn
1108 Alewife Brook Parkway Pump St. Rehab.	Arlington Belmont Cambridge Medford Somerville
1109 N. Metro. Trunk Sewer Rehab. Phase II	Chelsea East Boston Revere Winthrop
1110 Siphon Chamber & Diversion Structure Rehab.	All Wastewater Customers
1111 Wastewater Metering System Upgrade	Arlington Ashland Braintree Brookline Canton Chelsea Malden Medford Milton Natick Somerville Wellesley Winchester Winthrop
1112 Ashland Extension Sewer	Ashland
1113 System Master Plan Interceptors	Cambridge Chelsea Dedham Everett Malden Revere Somerville Woburn Winchester
1114 Corrosion and Odor Control Study	All Wastewater Customers
1115 Wastewater Facilities Rehabilitation	All Wastewater Customers
1116 West Roxbury Tunnel	Ashland Boston Brookline Dedham Framingham Natick Needham Wellesley
1117 Wastewater Central Monitoring	All Wastewater Customers
1201 Remote Headworks Rehabilitation	Arlington Bedford Belmont Boston Brookline Burlington Cambridge Chelsea Everett Lexington Malden Medford Melrose Milton Newton Reading Revere Somerville Stoneham Wakefield Waltham Watertown Wilmington Winchester Winthrop Woburn
1201A Deer Island Treatment Plant and Related Projects	All Wastewater Customers
1206 DI As-Needed Design/CS/RI	All Wastewater Customers
1207 DI Construction Services Contracts	All Wastewater Customers
1208 On-Site Generation of Sodium Hypochlorite	All Wastewater Customers
1209 DI Coastal Protection	All Wastewater Customers

Project Number / Project	Community(s) Affected
1210 DI Plant-Wide Systems	All Wastewater Customers
1211 Clinton Landfill Liner Repair	Clinton Lancaster Sewer District
1301 Residuals Management Facilities	All Wastewater Customers
1401 Combined Sewer Overflow Control Program	Boston Cambridge Chelsea Somerville
1501 Infiltration/Inflow Local Financial Assistance Program	All Wastewater Customers
2101 Walnut Hill Treatment Plant	All Water Customers (Except South Hadley, Chicopee, Wilbraham, Worcester, Clinton, and Leominster.)
2102 Quabbin Treatment Plant	South Hadley Chicopee Wilbraham
2104 Sudbury Watershed Protection	Southborough Marlborough Framingham
2105 Norumbega Covered Storage	Arlington Bedford Belmont Boston Brighton Cambridge Chestnut Hill Lexington Malden Medford Somerville Waltham Watertown Weston Winchester
2016 Nash Hill Covered Storage	Chicopee South Hadley Wilbraham
2107 Blue Hills Covered Storage	Quincy Milton Boston Canton Norwood
2108 Bear Hill Covered Storage	Stoneham Wakefield Winchester Woburn
2109 Fells Covered Storage	Stoneham Wakefield Melrose Saugus Malden Medford
2201 MetroWest Tunnel	All Water Customers (Except South Hadley, Chicopee, Wilbraham, Worcester, Clinton, and Leominster.)

Project Number / Project	Community(s) Affected
2202 Dam Control Valve Replacement	All Water Customers
2203 Sluice Gate Rehabilitation	All Water Customers
2204 Metropolitan Tunnel Loop	Arlington Bedford Belmont Boston Brighton Cambridge Chestnut Hill Lexington Malden Medford Somerville Waltham Watertown Weston Winchester
2206 Chicopee Valley Aqueduct Interconnections	Chicopee Wilbraham South Hadley Fire District
2207 Winsor Dam Hydroelectric	All Water Customers
2302 Valve Replacement	All Water Customers
2303 Cathodic Protection of Distribution Mains	All Water Customers
2305 Boston Low Service Pipe and Valve Rehab.	Boston Brookline
2306 WASM 1 and 2 Rehabilitation	Boston Cambridge Chelsea Everett Malden Medford Revere Somerville
2307 Nonantum Road Pipe Rehabilitation	Boston Cambridge Newton Watertown *Also improves pressure to the Northern High Service area in addition to source supply to all communities served by the Spot Pond Supply Mains
2309 Warren Cottage Line Rehabilitation	Boston Brookline
2310 Southern Service Improvements	Boston Brookline Canton Milton Norwood Quincy
2311 Heath Hill Pipe Replacement	Boston Brookline

Project Number / Project	Community(s) Affected
2312 Southern Spine Distribution Mains	Boston Brookline Milton Quincy Norwood Canton
2314 Southern Extra High - Sections 41 and 42	Boston Brookline Canton Milton Norwood
2315 Chestnut Hill Connecting Mains	Boston Brookline Newton
2317 Newton Service Improvements	Newton
2318 Commonwealth Ave. Pump Station Modernization	Newton
2319 Lexington St. Pump Station Rehabilitation	Waltham
2320 Rehabilitation of Other Pump Stations	Arlington Bedford Belmont Boston Brookline Canton Lexington Milton Norwood Waltham Watertown Winchester
2321 Bear Hill Improvements - Section 29 Rehabilitation	Stoneham Wakefield Winchester Woburn
2323 Spot Pond Pump Station Rehabilitation	Lynn Lynnfield Malden Marblehead Medford Melrose Nahant Peabody Saugus Stoneham Swampscott Wakefield Winchester Woburn
2324 WASM 4	Boston Cambridge Newton Watertown *Also improves pressure to the Northern High Service area in addition to source supply to all communities served by the Spot Pond Supply Mains
2325 Spot Pond Supply Mains	Arlington Boston Cambridge Chelsea Everett Malden Medford Somerville
2326 Northern Low Service Pipeline Replacement	Everett Medford Chelsea
2327 Water Main Relocation in Chelsea River	East Boston Logan Airport
2328 Northern Low Service Rehab. - Sections 8 & 57	Chelsea East Boston Everett Malden Medford
2329 New Connecting Mains - Shaft 7 to WASM 3	Arlington Bedford Belmont Boston Lexington Medford Newton Somerville Waltham Watertown Winchester
2331 Northern High Service - Section 26 Revere	Lynn Revere Saugus
2332 Northern High Service Connecting Mains to Sec. 91	Lynn Lynnfield Marblehead Nahant Revere Saugus Swampscott
2333 Northern High Service Pipe Impts - Lynn Pipeline	Lynn Marblehead Nahant Peabody Saugus Swampscott
2334 Northern High Service Section 27	Lynn Marblehead Nahant Peabody Swampscott
2335 Northern High Service Pipe Impts - Revere/Malden	East Boston Lynn Malden Marblehead Nahant Peabody Revere Saugus Winthrop
2336 Northern High Service Pipeline Rehabilitation	East Boston Everett Lynn Marblehead Nahant Revere Saugus Winthrop
2337 Northern Extra High Service - New Pipelines	Arlington Bedford Lexington Waltham
2401 Central Monitoring System	All Water Customers

Project Number / Project	Community(s) Affected
2402 Rehabilitation of Existing Facilities	All Water Customers
2403 Distribution Systems Facilities Mapping	All Water Customers
3101 North Maintenance Facility	All MWRA Customers
3102 Fore River Staging Area	All MWRA Customers
3103 Technical Assistance Contracts	All MWRA Customers
3104 Business Systems Plan	All MWRA Customers

Capital Expenditure Forecasts

Supplement to the

Proposed FY98-00 Capital Improvement Program

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About This Document

Capital expenditure forecasts, sometimes referred to as project cash flows, are presented in this supplement to the Proposed FY98-00 Capital Improvement Program. Capital project narratives and summary cost and schedule tables are presented in the primary CIP document. Expenditure forecasts are accrual based. As a result, projected expenditures are reported based on when services are expected to be rendered.

Projects appear in this report in the same order they appear in the primary CIP document, organized by capital program. Grant and loan receipts for various projects and programs appear at the end of each capital program section.

The following presents a description of each column in the expenditure forecast spreadsheets which comprise this document:

Project Names Project names are presented in the first column of the expenditure forecast and follow their respective CIP project numbers. They are in capital letters.

The Five Digit and Four Digit Contract Number Under each project name, you will find five and four digit numbers for each project phase. These numbers are assigned by the Rates and Budget Department prior to the contract award. Some phases do not have an assigned number because contract award is not imminent.

The five digit number represents the MWRA Financial Management System's (FMS) subphase number. Project budgets and expenditures are tracked by this account number.

The four digit number is a manually assigned contract identifier that is entered into the MWRA Purchasing and Stores Inventory (PSI) system as the contract reference number when the contract is executed. This reference number is used to access contract information such as the award amount, change order activity, and processed invoices.

Project Phase Next to the four digit contract number, you will find the name of the project phase. Project phases are typically defined components of projects like study, design, construction, or related services.

Project Participant	The **project participant** is the consultant, designer, or the contractor(s) who has been awarded the contract for the project phase. Non-awarded contracts are identified by "TBS" (to be selected).
Notice to Proceed and Substantial Completion	Project Schedules are identified by two key milestones. These milestones indicate the expected start and end dates for contract activity.
Total Contract Amount	The **Total Contract Amount** represents a contract's upset limit. For unawarded contracts, the contract amount is based on a cost estimate. For awarded contracts, this amount includes the award amount and any change orders, amendments, and purchase orders accounted for prior to finalizing the budget.
Projected Payments through FY97	The **Projected Payments through FY97** column presents total expenditures since the inception of the contract. Excluding the forecast used for the last three quarters of FY97, the amount is generated through FMS.
Remaining Balance 6/30/97	**Remaining Balance 6/30/97** is calculated by subtracting **Projected Payments through FY97** from the **Total Contract Amount**. This amount is then spread in the columns to the right, from FY98 to Beyond FY2002.
Expenditure Forecasts	The remaining columns in the spreadsheet contain projections for capital spending by project phase across fiscal years 1998 through 2002, and then beyond FY2002. Forecasts are divided by quarters for FY98, and presented annually for fiscal years 1999 through 2002. Expenditure forecasts for the fiscal years beyond 2002 are accumulated in the last column. Quarterly expenditure forecasts for the first fiscal year of the budget, FY98, are displayed. For FY99 and FY00, annual amounts are shown.

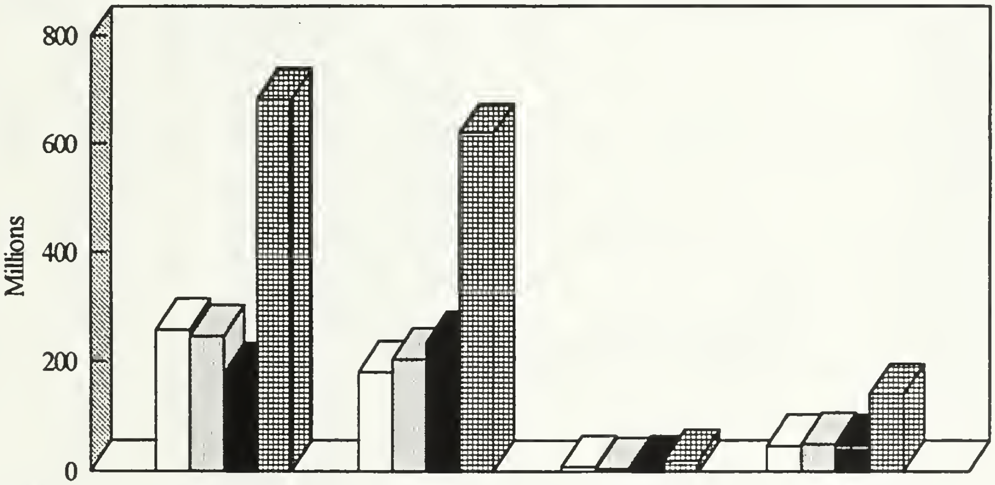
Capital Program Summary

The proposed Capital Improvement Program for FY98-00 includes projected three-year outlays of $1.5 billion in three separate programs: Wastewater (Boston Harbor Project and Wastewater System Improvements), Waterworks System Improvements, and Business and Operations Support. The chart and table below summarize the three-year projection of expenditures in each of the programs.

The Wastewater Program includes 29 projects expected to cost $4.4 billion. The Waterworks System Improvements Program contains 49 projects with a proposed budget of $1.7 billion. The Business and Operations Support Program consists of four projects with an expected cost of $39.3 million. The MWRA Contingency Funds and additional items included within the Business and Operations Support Program have a combined budget of $321.6 million.

Proposed FY98-00 MWRA Capital Improvement Program and Budget

($000s)



Capital Program	Wastewater	Waterworks	* B&OS	Contingency
□ FY98	$257,439	$179,814	$8,228	$45,471
□ FY99	247,222	205,134	3,845	49,410
■ FY00	176,286	234,155	6,553	44,811
⊞ Total	$680,947	$619,103	$18,626	$139,692

* Business and Operations Support

THREE-YEAR CAPITAL IMPROVEMENT SUMMARY BY MAJOR CATEGORY

PROPOSED CAPITAL IMPROVEMENT PROGRAM
EXPENDITURE FORECAST FY 1998-2000
($000)

	Total Contract Amount	Previous Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	3-YEAR TOTAL
Boston Harbor Project	$3,294,764	$2,864,267	$430,497	$52,372	$48,076	$38,353	$49,432	$188,233	$169,849	$63,402	$421,484
Wastewater System Improvements	1,065,793	397,038	668,755	13,017	24,680	17,313	14,196	69,206	77,373	112,884	259,463
Waterworks System Improvements	1,737,354	226,124	1,511,230	39,261	42,811	47,721	50,021	179,814	205,134	234,155	619,103
Business & Operations Support	39,255	13,060	26,195	5,252	992	992	992	8,228	3,845	6,553	18,626
Contingency	282,329	0	282,329	11,368	11,368	11,368	11,367	45,471	49,410	44,811	139,692
TOTAL	$6,419,495	$3,600,489	$2,919,006	$121,270	$127,927	$115,747	$126,008	$490,952	$505,611	$461,805	$1,458,368

TEN-YEAR CAPITAL IMPROVEMENT SUMMARY BY MAJOR CATEGORY

PROPOSED CAPITAL IMPROVEMENT PROGRAM
EXPENDITURE FORECAST FY 1998-2007
($000)

	FY98	FY99	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007	10-YEAR TOTAL
Boston Harbor Project	$188,233	$169,849	$63,402	$9,013	$0	$0	$0	$0	$0	$0	$430,497
Wastewater System Improvements	69,206	77,373	112,884	142,605	85,126	55,625	50,873	44,953	19,597	8,713	666,955
Waterworks System Improvements	179,814	205,134	234,155	255,874	215,984	139,480	90,699	68,196	45,389	37,205	1,471,930
Business & Operations Support	8,228	3,845	6,553	5,173	2,396	0	0	0	0	0	26,195
Contingency	45,471	49,410	44,811	48,750	36,140	21,470	14,341	10,893	6,451	4,592	282,329
TOTAL	$490,952	$505,611	$461,805	$461,415	$339,646	$216,575	$155,913	$124,042	$71,437	$50,510	$2,877,906

WASTEWATER IMPROVEMENT PROGRAM

Program Summary

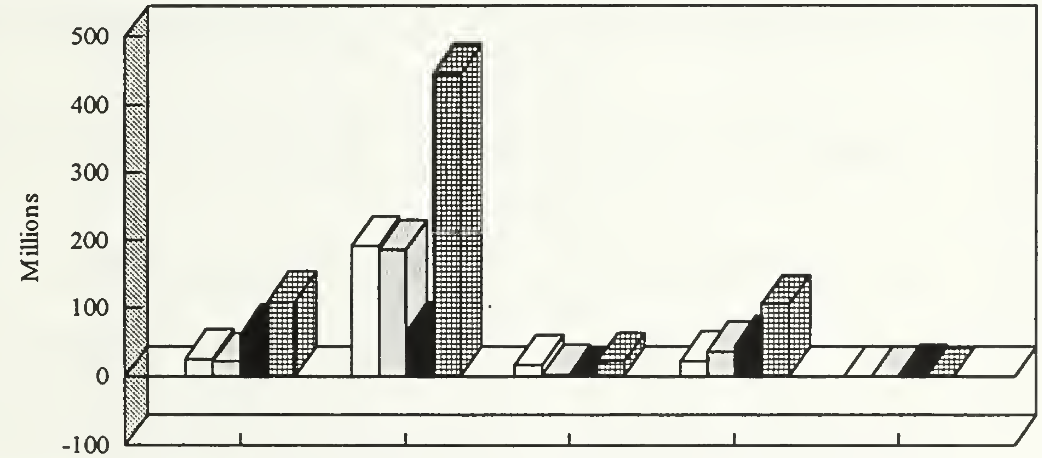
The proposed Wastewater Improvement Program for FY98-00 includes projected outlays of $680.9 million in five program categories: Interception and Pumping, Treatment, Residuals, Combined Sewer Overflows, and Other. The chart and table below summarize the three-year projection of expenditures in each of these program areas.

An additional $416.5 million in expenditures beyond FY00 will be needed to complete all projects.

Expenditures forecasts for individual capital projects in each program category follow this page.

Proposed FY98-00 Wastewater Improvement Program and Budget

($000s)



Prgm Category	Intercep & Pump	Treatment	Residuals	CSO's	Other (I/I)
□ FY98	$24,923	$191,943	$17,473	$23,766	($666)
□ FY99	21,635	185,797	4,008	36,048	(266)
■ FY00	63,078	65,709	0	45,365	2,134
⊞ Total	$109,636	$443,449	$21,481	$105,179	$1,202

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
A. INTERCEPTION AND PUMPING:																
1101 QUINCY PUMP FACILITIES																
10024 5400 Facilitias Plan/EIR	Whitman,Howard	Dec-87	Mar-95	$526	$526	$0					$0					$0
10025 5402 Design/CS - Rahab	R. Kimball	Jul-91	Canceled	131	131	0					0					0
10026 5403 Constr - Rehab	Harding&Smith	Jul-89	Jul-97	698	870	28	28				26					0
10033 5843 Land Acquisition	TBS	May-96	Jun-97	40	40	0					0					0
10027 5404 Design/CS/RI 1	Fay Spofford & Thomdik	Aug-94	Jul-2001	3,973	1,547	2,426	193	250	325	374	1,142	395	818	242	31	0
10028 5405 Construction 1	TBS	Jun-98	Aug-2000	3,440	0	3,440					0	1,700	1,500	240		0
10029 5407 Construction 2	TBS	Jul-99	Jul-2001	5,327	136	5,191					0		3,288	1,617	288	0
10030 5408 Construction 3	TBS	Jul-97	Sep-98	906	0	906		170	300	255	725	181				0
10031 5409 Construction 4	St Paul/Seabord Surety	Mar-93	Feb-95	2,086	2,086	0					0					0
10276 6102 Construction 5	TBS	Sep-97	Jun-98	4,636	0	4,636		1,000	2,065	1,200	4,265	371				0
10277 6103 Construction 6	TBS	Sep-97	Jun-98	1,795	0	1,795		300	800	426	1,526	269				0
10260 6069 Legal	TBS	Jul-95	May-2002	5	1	4				1	1	1	2			0
10261 6070 Public Ralations	TBS	Jul-95	Apr-2002	5	1	4				1	1	1	2			0
10262 6071 Haz Waste	TBS	Jul-95	Apr-2002	5	1	4				1	1	1	2			0
10032 5950 Technical Assistance	Various	Dec-87	Jan-2002	44	44	0					0					0
Project Total:				$23,617	$5,183	$18,434	$221	$1,720	$3,490	$2,268	$7,689	$2,919	$6,408	$2,099	$319	$0

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1102 BRAINTREE-WEYMOUTH RELIEF FACILITIES																
10045 5311 Fac Plan Phase 1	Maguire	Oct-81	Dec-90	$331	$331	$0					$0					$0
10046 5312 EIR Phase 1	Maguire	Nov-84	Oct-90	514	514	0					0					0
10057 5324 Final EIR/FacPlan	Metcalf&Eddy	Apr-91	Aug-93	1,124	1,124	0					0					0
10044 5332 Geotechnical-Land	Flores Test	Nov-91	Mar-92	8	6	0					0					0
10001 5333 Geotechnical-Marine	George&Drilling	Nov-91	Apr-92	443	443	0					0					0
10047 5313 Design 1/CS/RI	Stone & Webster	Nov-94	Feb-2002	8,874	3,069	5,805	250	250	250	250	1,000	500	750	2,400	1,000	155
10251 6016 Sedimantation Tests	Battelle	Sep-94	Apr-96	100	100	0					0					0
10058 5331 Design 2/CS/RI	Metcalf & Eddy	Apr-95	Jun-2002	4,880	1,739	3,141	200	100	100	100	500	550	840	769	482	0
10048 5314 Land Acquisition	TBS	Mar-97	Dec-99	3,313	16	3,297		10		15	25	3,000	272			0
10049 5315 Construction 1	TBS	May-99	Feb-2002	57,439	0	57,439					0	2,672	25,848	20,104	6,615	0
10050 5316 Construction 2	TBS	Jun-99	Oct-2001	16,698	0	16,698					0	835	9,184	5,844	635	0
10051 5303 Construction 3	TBS	Mar-2000	Mar-2001	10,671	0	10,671					0		3,805	7,066		0
10052 5373 Construction 4	TBS	May-2000	Feb-2001	9,114	0	9,114					0		911	8,203		0
10053 5374 Construction 5	TBS	Mar-2000	Jan-2001	4,985	0	4,985					0		997	3,988		0
10054 5375 Construction 6	TBS	Apr-2000	Jan-2002	5,043	0	5,043					0		504	2,774	1,765	0
10059 5317 Construction 7	TBS	Sep-2001	Apr-2002	4,241	0	4,241					0				4,029	212
10060 5310 Construction 8	TBS	Oct-2001	Jun-2002	2,536	0	2,536					0				2,409	127
10263 6072 Legal	TBS	Jul-95	Oct-2002	5	1	4		1			1	1	1	1		0
10264 6073 Public Ralations	TBS	Jul-95	Jun-2002	5	1	4		1			1	1	1	1		0
10265 6074 Haz Waste	TBS	Jul-95	Jun-2002	5	1	4		1			1	1	1	1		0
10055 5308 Design-Rehab	R. Kimball	Jul-91	Canceled	24	24	0					0					0
10056 5309 Constr - Rehab	Harding&Smith	Jan-92	Canceled	293	293	0					0					0
6119 Design/Marine Pipeline	TBS	May-96	May-2000	7,968	1,200	6,788	100	200	200	100	600	400	2,200	2,200	1,368	0
10061 5951 Technical Assistance	Various	Nov-84	May-2002	101	101	0					0					0
Project Total:				$138,915	$8,965	$129,950	$550	$563	$550	$465	$2,128	$8,160	$45,314	$53,351	$20,503	$494

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1103 NEW NEPONSET VALLEY RELIEF SEWER																
10062 5380 Facilities Plan	LEA	Apr-83	Dec-86	$594	$594	$0					$0					$0
10063 5381 EIR/Supp. Fac Plan	LEA	Jan-88	Dec-91	626	626	0					0					0
10064 5382 Design/CS/RI	Fay,Spofford	Feb-89	Sep-96	4,395	4,176	219	50	50	50	50	200	19				0
10065 5383 Land Acquisition	Various	Dec-90	Nov-93	845	491	354		75	100		175	179				0
10075 5378 Consultant-Milton	Milton C. C.	Mar-95	Jul-97	42	42	0					0					0
10076 5377 Consultant-Canton	Canton C.C.	Sep-93	Jul-97	182	162	0					0					0
10067 5385 Construction 1	Wescott Constr	Sep-93	Apr-96	5,196	5,196	0					0					0
10068 5390 Construction 2	D&C Construction	Dec-93	Nov-94	2,549	2,549	0					0					0
10069 5834 Construction 3	P. Gioloso &Sons	Apr-94	May-96	3,264	3,264	0					0					0
10070 5835 Construction 4	J.d. Amico	Jan-94	Oct-95	2,958	2,958	0					0					0
10071 5389 Construction 5	P. Caliacco Corp.	Dec-94	Sep-96	9,550	9,550	0					0					0
10072 5386 Study Dedham St	Thermo Water	Nov-90	Sep-96	1,000	1,000	0					0					0
10074 5379 Power Line	NE Telephone			64	64	0					0					0
10073 5952 Technical Assistance	Various	Apr-86	Mar-96	189	189	0					0					0
Project Total:				$31,434	$30,861	$573	$50	$125	$150	$50	$375	$198	$0	$0	$0	$0
1104 UPPER NEPONSET VALLEY RELIEF SEWER																
10255 6030 Planning/Des/CS/RI	TBS	Feb-2000	Oct-2003	$2,998	$0	$2,998					$0		$10	$500	$500	$1,988
Project Total:				$2,998	$0	$2,998	$0	$0	$0	$0	$0	$0	$10	$500	$500	$1,988
1105 WELLESLEY EXTENSION REPLACEMENT SEWER																
10091 5345 Study	SEA	Oct-81	Dec-84	$324	$324	$0					$0					$0
10080 5346 Design/EIR/CS/RI	SEA	Dec-84	Nov-2000	8,630	8,099	531	20	50	50	80	200	226	105			0
10081 5347 Land Acquisition	Various	Aug-88	May-98	4,041	3,269	772		100		100	200	300	150	122		0
10082 5348 Consultant-Needham	Needham C. C.	Jun-89	Sep-96	270	187	83	10	10	10	10	40	43				0
10083 5344 Consultant-Dedham	Dedham C. C.	Jun-89	Sep-96	120	107	13	13				13					0
10094 5842 Consultant-Dover	Dover C. C.	Aug-91	Sep-96	20	15	5	5				5					0
10084 5349 Construction 1	J.F.White	Jun-89	Jul-91	15,069	15,069	0					0					0
10086 5351 Construction 2	Modem Constr.	Sep-89	Sep-90	5,087	5,087	0					0					0
10087 5434 Construction 3	P. Gioioso	Mar-90	Jul-91	7,049	7,049	0					0					0
10085 5350 Construction 4	P. Gioioso	Jun-89	Sep-90	4,821	4,821	0					0					0
10088 5431 Construction 5	Modem Constr.	Nov-90	Apr-92	5,387	5,387	0					0					0
10089 5432 Construction 6	FED Corp.	Dec-91	Jul-92	2,068	2,068	0					0					0
10090 5433 Construction 7	Insituform of N E.	Sep-93	Feb-96	12,759	12,759	0					0					0
Construction 8	TBS	Nov-98	Nov-2000	8,039	0	8,039					0	2,114	3,020	905		0
10259 6065 EIC	S.G. Pinney & Assoc.	Sep-95	Nov-96	404	130	274	36	36	36	38	144	79	51			0
10269 6078 Legal	TBS	Feb-97	Mar-2000	230	226	4		1			1	2	1			0
10270 6079 Public Relations	TBS	Feb-97	Mar-2000	5	0	5		1	1	1	3	2				0
10093 5953 Technical Assistance	Various	Jun-89	Sep-95	193	193	0					0					0
Project Total:				$72,516	$64,790	$7,726	$84	$198	$97	$227	$606	$2,768	$3,327	$1,027	$0	$0

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1106 FRAMINGHAM EXTENSION RELIEF SEWER																
10099 5318 Fac Plan Update/EIR	Andarson,Nichol	Feb-90	Jul-90	$1,402	$1,402	$0					$0					$0
10100 5321 Land Acquisition	Various	Jun-91	Sep-99	2,070	990	1,080		300	100		400	330	233	117		0
10101 5319 Design/CS/RI	Anderson,Nichol	Jul-90	Oct-2000	6,338	5,283	1,055	45	75	90	106	316	267	315	157		0
10102 5320 Construction 1	J. D'Amico, Inc.	May-96	May-97	7,081	7,081	0					0					0
10103 5322 Construction 2	Zenone, Inc.	May-96	Jan-98	6,076	4,576	1,498	1,000	496			1,498					0
10104 5323 Construction 3	Westcott Construction	Jul-96	Apr-98	6,739	3,034	3,705	1,145	1,076	808	674	3,705					0
10106 5825 Construction 4	Insituform of N.E.	Jun-94	Mar-95	4,610	4,610	0					0					0
10107 5342 Construction 5	TBS	Feb-99	Oct-2000	12,656	0	12,656					0	4,430	6,326	1,898		0
10105 5954 Technical Assistance	Various	Feb-90	May-2000	147	147	0					0					0
Project Total:				$47,319	$27,325	$19,994	$2,190	$1,961	$998	$780	$5,919	$5,027	$6,876	$2,172	$0	$0
1107 CUMMINGSVILLE REPLACEMENT SEWER																
10217 5826 Fac Plan/EIR	Weston&Sampson	Jun-92	Jul-95	$605	$605	$0					$0					$0
10275 6092 Design/CS/RI	TBS	Nov-97	Nov-2002	604	0	604	30	30	30	40	130	100	107	137	130	0
Land Acquisition	TBS	Nov-99	Nov-2000	12	0	12					0	6	6			0
Construction	TBS	Mar-2001	Nov-2002	3016	0	3,016					0			1,509	1,509	0
Project Total:				$4,239	$605	$3,634	$30	$30	$30	$40	$130	$106	$113	$1,646	$1,639	$0
1109 NORTH METROPOLITAN TRUNK SEWER - PHASE II																
10240 5329 Design	In-house	Dec-92	Nov-95	$0	$0	$0					$0					$0
10241 5339 Construction	United Gunite Constr.	Aug-96	Aug-98	13,476	7,036	6,440	3,000	1,500	1,000	500	6,000	440				0
Project Total:				$13,476	$7,036	$6,440	$3,000	$1,500	$1,000	$500	$6,000	$440	$0	$0	$0	$0
1110 SIPHON STRUCTURE REHABILITATION																
10253 6017 Planning	Anderson-Nichols	Jan-96	Dec-97	$660	$564	$96	$96				$96	$0	$0	$0		$0
Design/CS/RI	TBS	Oct-98	Jun-2000	1,100	0	1,100					0	0	345	550	205	0
Construction	TBS	Feb-2002	Jun-2003	3,400	0	3,400					0	0			170	3,230
Legal	TBS	Apr-98	Aug-2001	5	0	5				1	1	0	1	2	1	0
Public Relations	TBS	Jun-97	Jun-2003	5	0	5	1				1	0	1	1	1	1
Land Easemant	TBS	Mar-98	Aug-2001	310	0	310			55	80	135	150	25			0
Project Total:				$5,480	$564	$4,916	$97	$0	$55	$81	$233	$150	$372	$553	$377	$3,231

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1111 WASTEWATER METERING SYSTEM UPGRADE																
10271 6080 Design In-house	TBS	Oct-94	Sep-96	$10	$10	$0					$0	$0				$0
10272 6081 Construction	TBS	Apr-96	Jun-97	490	490	0	0				0	0				0
Project Total:				$500	$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1112 ASHLAND EXTENSION SEWER																
Planning/Design	TBS	Sep-98	Jun-2003	$1,000	$0	$1,000					$0	$185	$265	$300	$250	$0
Land Acquisition	TBS	Nov-98	Mar-2004	5	0	5	5				5					0
Project Total:				$1,005	$0	$1,005	$5	$0	$0	$0	$5	$185	$265	$300	$250	$0
1113 SYSTEM MASTER PLAN INTERCEPTORS																
Planning/Design	TBS	Sep-97	Oct-2002	$2,593	$0	$2,593	$50	$50	$100	$150	$350	$548	$503	$550	$440	$202
Mystic Valley Sewer Sct. 153	TBS	Dec-2003	Dec-2005	977	0	977					0					977
Revere Branch Sect. 62	TBS	Dec-2003	Dec-2005	2,940	0	2,940					0					2,940
Neponset Valley Sec. 15-21	TBS	Dec-2003	Dec-2005	7,940	0	7,940					0					7,940
Cambridge Branch 23-25	TBS	Dec-2003	Dec-2005	3,565	0	3,565					0					3,565
Malden Branch Sect. 65 & 66	TBS	Dec-2003	Dec-2005	783	0	783					0					783
Project Total:				$18,798	$0	$18,798	$50	$50	$100	$150	$350	$548	$503	$550	$440	$16,407
1114 CORROSION & ODOR CONTROL STUDY																
10279 6137 Planning/Study	TBS	Oct-96	Feb-98	$685	$313	$372	$150	$129	$93		$372					$0
Project Total:				$685	$313	$372	$150	$129	$93	$0	$372	$0	$0	$0	$0	$0
1115 WASTEWATER FACILITIES REHABILITATION																
Inventory and Evaluation	TBS	Sep-97	Feb-2002	$1,532	$0	$1,532	$75	$150	$180	$133	$538	$314	$218	$186	$154	$122
Construction	TBS	Oct-99	Jan-2005	1,732	0	1,732					0	672	672	143	130	115
Project Total				$3,264	$0	$3,264	$75	$150	$180	$133	$538	$986	$890	$329	$284	$237
1116 WEST ROXBURY TUNNEL																
Inspection	TBS	Jul-97	Sep-97	$115	$0	$115	$100	$15			$115					$0
Engineering Report	TBS	Oct-97	Feb-98	100	0	100		70	30		100					0
Project Total				$215	$0	$215	$100	$85	$30	$0	$215	$0	$0	$0	$0	$0

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1117 WASTEWATER CENTRAL MONITORING																
Planning	TBS	Nov-97	Nov-98	$600	0	600		$150	$150	$150	$450	$150				$0
Project Total				$600	$0	$600	$0	$160	$150	$150	$450	$150	$0	$0	$0	$0
1199 FINAL PAYMENTS & RELEASE OF RETAINAGE																
10134 5360 Design - East Boston	Metcalf & Eddy			$1,976	$2,181	($205)	($205)				($205)					$0
10011 5399 Study/Design - Metering	Whitman & Howard			1,337	1,219	118	118				118					0
10014 5395 Construction 3 - Metering				984	984	0					0					0
10016 5301 Purchase - Metering				15	15	0					0					0
10015 5464 Easements - Metering				2	2	0					0					0
10017 5415 Printing				0	0	0					0					0
10135 5361 RI - East Boston				4,075	4,075	0					0					0
10140 5366 Constr-Nth Met Sewer				5,747	5,747	0					0					0
10152 5355 Design/RI - Charlestown	CDM			3,772	3,772	0					0					0
10153 5357 Constr. - Charlestown	White Contracting			25,274	25,274	0					0					0
10158 5356 Haz Mat Disposal - Charlestown				3,798	3,798	0					0					0
10160 5391 Hazardous Waste NOR	ENSR Consulting			367	367	0					0					0
10161 5827 Litgitation Asst - Charlestown	ERM New England			131	131	0					0					0
Project Total:				$47,478	$47,565	($87)	($87)	$0	$0	$0	($87)	$0	$0	$0	$0	$0
SUBTOTAL: INTERCEPTION & PUMP.				$412,539	$193,707	$218,832	$6,516	$6,651	$6,923	$4,834	$24,923	$21,636	$63,078	$62,527	$24,312	$22,357

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B. TREATMENT:																
1201 REMOTE HEADWORKS REHABILITATION																
17812 5469 Rehab - Constr 1	Sequoia Constr	Jul-93	Dec-94	$112	$112	$0					$0					$0
17815 5413 Rehab - Design 2/RI	Anderson-Nichols	Nov-94	May-95	158	158	0					0					0
17813 5480 Rehab - Constr 2	TBS	Sep-96	Sep-97	535	510	25	25				25					0
17816 5414 Rehab - Constr 3	Soucy Wire & Iron	Apr-96	Jan-98	1,116	412	704	150	500	54		704					0
17814 5962 Technical Assistance	TBS	Jul-93	Apr-97	93	93	0					0					0
17817 6039 Elevator Rehab - Design	Bayside Engineering	Feb-96	Oct-96	73	73	0					0					0
19140 6082 Elevator Rehab - Constr	TBS	Aug-97	Jun-98	1367	0	1,367	200	300	300	300	1,100	267				0
Project Total:				**$3,454**	**$1,358**	**$2,096**	**$375**	**$800**	**$354**	**$300**	**$1,829**	**$267**	**$0**	**$0**	**$0**	**$0**
1202 BOSTON HARBOR PEFORMANCE CERTIFICATION																
19139 6068 Phase I	Metcalf & Eddy	May-96	Aug-97	$600	$405	$195	$57	$49	$49	$40	$195					$0
Phase II	TBS	Mar-98	Jun-99	600	0	600				89	89	356	155			0
Phase III	TBS	Jun-2000	Aug-2001	300	0	300					0			200	100	0
Project Total:				**$1,500**	**$405**	**$1,095**	**$57**	**$49**	**$49**	**$129**	**$284**	**$356**	**$155**	**$200**	**$100**	**$0**
ONGOING CAPITAL IMPROVEMENTS DEER ISLAND TREATMENT PLANT																
1206 DEER ISLAND AS-NEEDED DESIGN/CS/RI																
Contract Services	TBS	Oct-97	Oct-99	$500	$0	$500	$0	$0	$100	$100	$200	$200	$100			
Project Total				**$500**	**$0**	**$500**	**$0**	**$0**	**$100**	**$100**	**$200**	**$200**	**$100**	**$0**	**$0**	**$0**
1207 DEER ISLAND CONSTRUCTION SERVICES CONTRACTS																
Construction - HVAC	TBS	Dec-97	Dec-2000	$375	$0	$375			$30	$33	$63	$125	$125	$62		$0
Construction - Plumbing	TBS	Dec-97	Dec-2000	375	0	375			30	33	63	125	125	62		0
Construction - Electrical	TBS	Dec-97	Dec-2000	375	0	375			30	33	63	125	125	62		0
Construction - Site Work	TBS	Dec-97	Dec-2000	375	0	375			30	33	63	125	125	62		0
Project Total				**$1,500**	**$0**	**$1,500**	**$0**	**$0**	**$120**	**$132**	**$252**	**$500**	**$500**	**$248**	**$0**	**$0**

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1208 ON-SITE GENERATION OF SODIUM HYPOCHLORITE																
Design/CS/RI	TBS	Dec-97	May-98	$2,323	$0	$2,323		$50	$274	$274	$598	$1,500	$225			$0
Construction	TBS	Jan-99	Jun-99	14,327	0	14,327					0	13,000	1,327			0
Project Total				$16,650	$0	$16,650	$0	$50	$274	$274	$598	$14,500	$1,552	$0	$0	$0
1209 DEER ISLAND COASTAL PROTECTION																
Coastal Protection	TBS	TBD	TBD	$0	$0	$0					$0					$0
Project Total				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1210 DEER ISLAND PLANT-WIDE SYSTEMS																
DISC Application	TBS	Oct-97	Apr-99	$250	$0	$250		$50	$25	$50	$125	$125				$0
Project Total				$250	$0	$250	$0	$50	$25	$50	$125	$125	$0	$0	$0	$0
CLINTON TREATMENT PLANT																
1211 CLINTON LANDFILL LINER REPAIR																
Design	TBS	Jul-97	Sep-97	$75	$0	$75		$50	$25		$75					$0
Construction	TBS	Oct-97	Dec-97	325	0	325			325		325					0
Project Total				$400	$0	$400	$0	$50	$350	$0	$400	$0	$0	$0	$0	$0
1299 FINAL PAYMENTS & RELEASE OF RETAINAGE																
19063 5440 Design/CS - Clinton	CDM			$4,116	$4,116	$0					$0					
19096 5561 NI Immed Design				1233	1,211	22	22				22					0
Project Total:				$5,349	$5,327	$22	$22	$0	$0	$0	$22	$0	$0	$0	$0	$0
SUBTOTAL: TREATMENT				$29,603	$7,090	$22,513	$454	$999	$1,272	$985	$3,710	$15,948	$2,307	$448	$100	$0

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1204			D.I. PRIMARY & SECONDARY TREATMENT FACILITY																
FACILITIES PLANNING																			
17981	5540	—	Surveying				$15	$15	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18621	5526	—	Facilities Plan	CDM			16,518	16,518	0	0	0	0	0	0	$0	0	0		0
			Phase Total:				$16,533	$16,533	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SITE FACILITIES CONSTRUCTION																			
18020	5536	CP-020	Asbestos Rmvl Ft Dawes-SPS	Dec - Tam	Jun-89	Jan-90	$518	$518	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18021	5599	CP-021	Demo Ft. Dawes Bunkers	J.M. Cashman	Aug-89	Apr-90	4,617	4,617	0	0	0	0	0	0	0	0	0		0
18022	5601	CP-022	Earthworks/Lndfl/Roadwys	J.M. Cashman	Jan-90	Nov-91	17,107	17,107	0	0	0	0	0	0	0	0	0		0
18023	5600	CP-023	Pump Sta Mods & Sewers	Modern	Jan-90	Nov-90	5,713	5,713	0	0	0	0	0	0	0	0	0		0
18024	5740	CP-024	Admin/Lab:Maint/Whse/Trn&Supt Ha	Modern	Apr-92	Dec-94	48,894	48,894	0	0	0	0	0	0	0	0	0		0
18027	5728	CP-027	Maint Shops Facil. Ph. I	Sciaba	Sep-91	Apr-92	395	395	0	0	0	0	0	0	0	0	0		0
18028	5841	CP-028	Maint Shops Facil. Ph. II	J.M. Cashman	Dec-91	Sep-92	1,970	1,970	0	0	0	0	0	0	0	0	0		0
18030	5840	CP-030	Disposal of Excess Till	J.M. Cashman	Aug-90	Dec-91	14,137	14,137	0	0	0	0	0	0	0	0	0		0
18040	5739	CP-040	DI Demo/Late Drumlin Excv	J.M. Cashman	Dec-91	Jun-94	16,758	16,758	0	0	0	0	0	0	0	0	0		0
18042	5481	CP-042	Remov of Temp Facilities	TBS	Jul-99	Dec-99	250	0	250	0	0	0	0	0	0	250	0		0
18043	5474	CP-043	Site Prep/Dem Exst Trmt Plnt	Modern	Feb-94	Jun-97	39,317	38,817	500	250	250	0	0	500	0	0	0		0
18047		CP-048	Western Shoreline Protection	Newberg/Walsh	Oct-97	Dec-99	20,210	0	20,210	0	2,143	2,505	1,320	5,968	11,726	2,516	0		0
18044		CP-044	Final Paving and Landscaping	TBS	Mar-98	Jun-2000	27,955	0	27,955	0	0	0	3,687	3,687	14,903	6,910	2,455		0
18046		CP-046	Dry Storage Building	TBS	Jan-98	Feb-2000	4,196	0	4,196	0	0	431	476	907	2,170	919	200		0
			Design of CP-046	TBS	Mar-97	Apr-97	0	0	0	0	0	0	0	0	0	0	0		0
18049	5719	CP-049	Hazardous Mtl Rem Ph I	Tricil	Jun-91	Jun-94	7,433	7,433	0	0	0	0	0	0	0	0	0		0
18050	5729	CP-050	Hazardous Mtl Rem Ph II	E.W.T.	Apr-94	Apr-96	1,660	1,660	0	0	0	0	0	0	0	0	0		0
18051	6098	CP-051	Hazardous Mtl Rem Ph III	TBS	Apr-96	Apr-98	1,910	1,011	899	305	255	199	100	859	40	0	0		0
18905	5537	CP-905	Supply & Del. Concrete	Boston S&G	Apr-90	Dec-99	12,980	8,134	4,846	351	351	483	483	1,668	1,724	1,454	0		0
18430	5633		Int. Xfmr. & Switchgear	Lasden/WESCO	Jan-90	May-90	216	216	0	0	0	0	0	0	0	0	0		0
26823	5649	CP-805	D.I. Sludge Transfer Fac	Sciaba	Oct-90	Sep-91	4,514	4,514	0	0	0	0	0	0	0	0	0		0
			Phase Total:				$230,750	$171,894	$58,856	$906	$2,999	$3,618	$6,066	$13,589	$30,563	$12,049	$2,655	$0	$0
PRETREATMENT & PRIMARY CONSTRUCTION																			
18101	5707	CP-101	North System Tunnels	Kwt/Atkn/Knny	Dec-90	Jul-92	$20,623	$20,623	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18102	5722	CP-102	North Main Pump Station	J.F. Whte/PKF	Jun-91	Jun-97	91,273	89,414	1,859	1,042	817	0	0	1,859	0	0	0		0
18103	5720	CP-103	North System Headworks	Britta/O'Cnnll	May-91	Dec-94	96,097	96,097	0	0	0	0	0	0	0	0	0		0
18104	5733	CP-104	South System Pump Station	Dick Corp	Nov-91	Nov-97	42,075	41,139	936	170	325	290	151	936	0	0	0		0
18105	5700	CP-105	Primary Clarifier Bttrys A&B	Gust Newberg	Mar-91	Dec-94	100,197	100,197	0	0	0	0	0	0	0	0	0		0
18130	5742	CP-130	Primary Clarifer Bttrys C&D	George Hyman	Mar-92	Jul-95	84,405	84,405	0	0	0	0	0	0	0	0	0		0
18151	5641	CP-151	Inter-Island Tnl/Ext Otfl	Hearly/Modern	Apr-91	Sep-97	147,324	139,641	7,683	4,011	2,712	960	0	7,683	0	0	0		0
18152	5850	CP-152	Nut Isl. Headworks	Modern/SAE	Jul-92	Jun-98	65,672	61,467	4,205	150	150	721	2,189	3,210	995	0	0		0
18153	5639		Nut Island HW Equip	various	Mar-91	Mar-92	347	347	0	0	0	0	0	0	0	0	0		0
18150	5464	CP-150	Ancil. D. I. Mods Ph. I	Modern	Mar-95	Dec-96	10,246	10,246	0	0	0	0	0	0	0	0	0		0
			Concrete Coating/Repair & Upgr	TBS	Mar-97	Dec-97	15,999	7,513	8,486	5,704	2,782	0	0	8,486	0	0	0		0
			Phase Total:				$674,258	$651,089	$23,169	$11,077	$6,786	$1,971	$2,340	$22,174	$995	$0	$0	$0	$0

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SECONDARY CONSTRUCTION																
18201 5743 CP-201 Permanent Pilot Plant	Peabody	Dec-91	Dec-94	$11,942	$11,942	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18202 5484 CP-202 Secondary Reactor Bttry A&B	J.F. White/PKF	Nov-92	Dec-96	118,392	117,896	496	496	0	0	0	496	0	0	0		0
18203 5482 CP-203 Secondary Clarifier Bttry A&B	J.F. White/PKF	Aug-93	Dec-97	147,622	140,055	7,567	4,050	2,495	511	511	7,567	0	0	0		0
18204 5744 CP-204 Disinfect Fcity Ph I/Seawall	Newberg/Walsh	Aug-92	Feb-96	41,906	41,906	0	0	0	0	0	0	0	0	0		0
18205 5604 CP-205 Water Storage Tank	R. Zoppo	Dec-92	Jan-95	9,061	9,061	0	0	0	0	0	0	0	0	0		0
18210 5040 CP-210 Ancil D.I. Mode Ph II	TBS	Jul-96	Jan-98	3,808	2,621	1,187	446	297	244	200	1,187	0	0	0		0
18211 CP-211 Ancil. D.I. Mod. Ph III	TBS	Jun-97	Jun-99	10,021	418	9,603	1,254	1,254	1,254	1,254	5,016	3,600	987	0		0
CP-212 Ancil. D.I. Mod. Ph IV	TBS	Jun-98	Jun-2000	15,325	0	15,325	0	0	0	639	639	7,668	4,518	2,500		0
18241 5544 CP-241 Disinfect Fcity / Hydro Plant Ph. II	Walsh	Jul-93	Nov-96	37,752	35,840	1,912	223	223	223	223	892	1,020	0	0		0
18260 CP-260 Secondary C Reactor and Clarifier Btt	TBS	Dec-96	Dec-99	141,267	10,403	130,864	10,223	13,468	9,509	17,076	50,276	57,688	22,900	0		0
18270 5548 Prepurchase	various	Dec-93	Dec-96	959	959	0	0	0	0	0	0	0	0	0		0
18282 5637 CP-282 Effluent Outfall Tunnel	Kwt/Atkn/Knny	Aug-90	Sep-98	274,593	245,442	29,151	2,998	2,998	2,421	2,361	10,778	18,373	0	0		0
18283 5638 CP-283 Effluent Outfall Diffusers	Cashman/Intrb	Aug-90	Nov-92	77,088	77,088	0	0	0	0	0	0	0	0	0		0
18285 5724 CP-285 Effl Otfl Tnl Muck Proc&Disp	Cashman	Sep-91	Nov-94	14,449	14,449	0	0	0	0	0	0	0	0	0		0
18286 CP-285 Effl Otfl Tnl Muck Proc&Disp PHII	Cashman	Dec-94	Jul-97	17,453	16,953	500	200	200	100	0	500	0	0	0		0
Phase Total:				$921,638	$726,033	$196,605	$19,890	$20,936	$14,262	$22,264	$77,361	$88,349	$28,405	$2,500	$0	$0
ON-ISLAND RESIDUALS CONSTRUCTION																
18301 5723 CP-301 Res Trt Fac Ph I Pri A,B,C&D	Prnl/Estrn	Aug-91	Dec-95	$213,795	$213,795	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18303 5483 CP-303 Res Trt Fac Ph I Sec A&B	Hyman	Oct-93	Jun-97	98,376	96,165	2,211	1,457	754	0	0	2,211	0	0	0		0
Phase Total:				$312,171	$309,960	$2,211	$1,457	$754	$0	$0	$2,211	$0	$0	$0	$0	$0
PERMANENT UTILITIES CONSTRUCTION																
18401 5515 CP-401 Off Island Water Line	LinGioioso	Jan-93	Nov-95	$14,671	$14,671	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18427 5710 CP-427 Mn 13.8 Swgr,Bld&Dist/Yd Util	Sciaba	Jun-91	Mar-95	21,245	21,245	0	0	0	0	0	0	0	0	0		0
18428 5745 CP-428 On-Site Power Plant for DI	J.F.White/PKF	Jan-93	May-97	76,667	76,167	500	350	150	0	0	500	0	0	0		0
18431 5768 CP-431 BECO CTG	Beco	Jan-94	May-95	34,365	34,365	0	0	0	0	0	0	0	0	0		0
18460 5545 CP-460 Instrumentation & Cntrl Ph 1	Bailey	Jan-93	Oct-99	21,228	14,724	6,504	422	422	422	421	1,687	2,432	2,385	0		0
18460 5590 Facility Information System	various	Jan-93	Aug-97	6,462	6,062	400	200	125	75	0	400	0	0	0		0
18462 5588 CP-462 Plant Communication System	Fschbch&Moore	Jan-93	May-99	12,431	9,804	2,627	256	405	405	256	1,322	905	400	0		0
Phase Total:				$187,069	$177,038	$10,031	$1,228	$1,102	$902	$677	$3,909	$3,337	$2,785	$0	$0	$0

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CONSTRUCTION SUPPORT SERVICES																			
17979	6964		Technical Assistance				$374	$374	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
19429	5711		Construction Power	Boston Edison	Jan-90	Dec-99	12,740	10,935	1,805	320	290	255	205	1,070	535	200	0		0
19940	5745		Construction Water @ D.I.	Town of Winthrop	Jul-91	Dec-99	2,164	1,975	189	44	43	13	12	112	34	34	9		0
18425	5469		Interim Utilities	various	Oct-94	Mar-97	1,217	1,217	0	0	0	0	0	0	0	0	0		0
18901	5515	CP-901	Construction Spport Bldg	Sciaba	Sep-90	Jul-91	4,067	4,067	0	0	0	0	0	0	0	0	0		0
18902	5996	CP-902	Construction Rds & Utilities	Welch	Nov-90	Jan-92	5,153	5,153	0	0	0	0	0	0	0	0	0		0
19903	5695	CP-903	Fuel Facility	Sciaba	Oct-90	Sep-91	1,665	1,665	0	0	0	0	0	0	0	0	0		0
18904	5692	CP-904	Fuel Supplier I	Grimes	Jul-90	May-92	126	126	0	0	0	0	0	0	0	0	0		0
18920	5999	CP-920	Fuel Supplier II	Taylor Oil	Jun-92	Aug-96	50	50	0	0	0	0	0	0	0	0	0		0
18924	5121	CP-924	Fuel Supplier III	Taylor Oil	Aug-96	Dec-98	400	157	243	43	43	43	43	172	71	0	0		0
18909	5609	CP-909	Security I	N.E. Security	Oct-89	Oct-90	198	198	0	0	0	0	0	0	0	0	0		0
19917	5715	CP-917	Security II	N.E. Security	Nov-90	Dec-92	1,196	1,196	0	0	0	0	0	0	0	0	0		0
18930	5499	CP-930	Security III	Bview Security	Dec-92	Dec-94	1,233	1,233	0	0	0	0	0	0	0	0	0		0
18935	5689	CP-935	Security IV	Wackenhut	Jan-95	Dec-96	1,327	1,327	0	0	0	0	0	0	0	0	0		0
18942	9147	CP-942	Security V	Wackenhut	Jan-97	Mar-2000	2,116	324	1,792	162	162	162	162	648	648	496	0		0
18910	5998	CP-910	Site & FRSA Maintenence	Sciaba	Oct-90	Nov-92	1,898	1,898	0	0	0	0	0	0	0	0	0		0
18931	5506	CP-931	Site & FRSA Maintenence II	Sciaba	Nov-92	Nov-94	2,476	2,476	0	0	0	0	0	0	0	0	0		0
18937	5774	CP-936	Site & FRSA Maintenence III	Zoppo	Nov-94	Nov-96	3,538	3,538	0	0	0	0	0	0	0	0	0		0
19943	5149	CP-943	Site & FRSA Maintenance IV	Zoppo	Nov-96	Dec-98	4,290	1,320	2,970	495	495	495	495	1,980	990	0	0		0
		CP-970	Site & FRSA Maintenance V	TBS	Jan-99	Dec-2000	2,491	0	2,491	0	0	0	0	0	630	1,231	630		0
18911	5697	CP-911	Trash Disposal DI/FRSA	D&E/Jet	Jul-90	Jul-93	852	852	0	0	0	0	0	0	0	0	0		0
18933	5844	CP-933	Trash Handling & Disposal II	Vining Disposal	Jun-93	Jun-95	954	954	0	0	0	0	0	0	0	0	0		0
18938	6041	CP-939	Trash Handling & Disposal III	Vining Disposal	Jul-95	Jun-97	852	852	0	0	0	0	0	0	0	0	0		0
19944	5191	CP-944	Trash Handling & Disposal IV	TBS	Jul-97	Dec-99	808	38	770	92	92	90	90	364	244	162	0		0
19912	5989	CP-912	Off-Site Maint & CSB Hskp	Capital	Dec-90	Jan-93	205	205	0	0	0	0	0	0	0	0	0		0
19934	5511	CP-934	Off-Site Maint & CSB Hskp II	Sunshine	Feb-93	Feb-95	315	315	0	0	0	0	0	0	0	0	0		0
18939	5792	CP-939	Off-Site Maint & CSB Hskp III	Sunshine	Feb-95	Feb-97	441	441	0	0	0	0	0	0	0	0	0		0
19945	5179	CP-945	Off-Site Maint & CSB Hskp IV	TBS	Feb-97	Feb-99	443	90	353	54	54	54	54	219	137	0	0		0
19972		CP-972	Off-Site Maint & CSB Hskp V	TBS	Jan-99	Dec-2000	383	0	383	0	0	0	0	0	96	192	95		0
18950	5747	CP-950	Construction Support Labor	Sciaba	Aug-91	Aug-92	735	735	0	0	0	0	0	0	0	0	0		0
19951	5520	CP-951	Const. Supt. Labor Ph. II	Zoppo	Aug-92	Jul-93	3,992	3,992	0	0	0	0	0	0	0	0	0		0
18952	5493	CP-952	Const. Supt. Labor Ph. III	Zoppo	Jul-93	Jul-95	5,855	5,955	0	0	0	0	0	0	0	0	0		0
18953	6053	CP-953	Const. Supt. Labor Ph. IV	Zoppo	Aug-95	Jul-97	5,796	5,332	464	464	0	0	0	464	0	0	0		0
		CP-954	Const. Supt. Labor Ph. V	TBS	Aug-97	Jul-99	3,000	0	3,000	250	375	375	375	1,375	1,126	499	0		0
19137	9051		Construction Services	various	Aug-95	Sep-96	2,000	2,000	0	0	0	0	0	0	0	0	0		0
19960	5539	CP-960	Const. Supt Labor - Electrical	Fschbach&Moore	May-93	May-95	909	909	0	0	0	0	0	0	0	0	0		0
18991	5539	CP-961	Const. Supt Labor - Plumbing	Kennedy&Sons	Jul-94	Jun-96	572	572	0	0	0	0	0	0	0	0	0		0
18992	5543	CP-962	Const. Supt Labor - HVAC	HVAC Engineer	Apr-94	Apr-96	409	409	0	0	0	0	0	0	0	0	0		0
18970	6052	CP-963	Const. Supt Labor Ph II-ELEC	Lynwell Assoc	Jul-95	Aug-96	994	994	0	0	0	0	0	0	0	0	0		0
19964	5096	CP-964	Const Supt Labor Ph. II - Plumbing	TBS	Jun-96	Jun-99	1,000	336	664	83	83	83	83	332	332	0	0		0
19995	9097	CP-965	Const Supt Labor Ph. II- HVAC	TBS	May-96	May-99	992	336	656	92	92	92	92	329	329	0	0		0
19144	5139	CP-969	Const. Supt Labor Ph III-ELEC	TBS	Aug-96	Aug-98	1,794	925	969	225	225	225	225	900	69	0	0		0
		CP-969	Const. Supt Labor Ph IV-ELEC	TBS	Aug-98	Dec-2000	1,000	0	1,000	0	0	0	0	0	388	408	204		0
19922	5717	CP-922	Ofst Snw Rltd Serv&Asphl Swp	Boston Zgrvgn	Oct-90	Nov-92	134	134	0	0	0	0	0	0	0	0	0		0
19932	5630	CP-932	Ofst Snw Serv & Aspht Swp II	Boston GravDoc	Nov-92	Dec-94	589	589	0	0	0	0	0	0	0	0	0		0
19939	5773	CP-937	Ofst Snw Serv & Aspht Swp III	Webster/Cashman	Jan-95	May-97	610	610	0	0	0	0	0	0	0	0	0		0
18946	5145	CP-946	Ofst Snw Serv & Asphl Swp IV	TBS	May-97	Jun-99	575	35	540	69	69	69	69	276	264	0	0		0
19973		CP-973	Ofst Snw Serv & Aspht Swp V	TBS	Jul-99	Dec-2000	431	0	431	0	0	0	0	0	0	288	143		0
19913	5539B	CP-913	Rodent Control	A-1	Jul-89	Jul-91	34	34	0	0	0	0	0	0	0	0	0		0
18919	5736	CP-919	Rodent Control II	A-1	Sep-91	Sep-95	134	134	0	0	0	0	0	0	0	0	0		0
19947	6065	CP-947	Rodent Control III	P. Clancy & Sons	Jan-96	Dec-99	41	19	22	3	2	2	3	10	8	4	0		0
			Phase Total:				$85,568	$95,826	$19,742	$2,386	$2,016	$1,948	$1,898	$9,247	$5,900	$3,514	$1,081	$0	$0

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CONSTRUCTION MANAGEMENT																			
18601	5535	—	P/CM Services	Kaiser	Apr-88	Jun-91	$18,354	$18,354	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18602	5822	—	CM Services (90-98)	Kaiser	Aug-90	Dec-98	247,158	206,789	40,369	7,123	7,090	6,636	6,560	27,409	12,960	0	0		0
			CM Services (99-2004)	TBS	Jan-99	Dec-2004	15,532	0	15,532	0	0	0	0	0	9,072	6,460	0		0
18603	5761	—	Facilities Training	M & E	Jul-90	Jun-2000	3,575	2,579	996	52	52	52	52	208	183	605	0		0
18604	5486	—	Project Offices	Flatley	Jul-88	Jun-98	6,083	5,837	246	63	61	61	61	246	0	0	0		0
18605	5888	—	Mgmt Support Services	HP	Jul-88	Jul-90	505	505	0	0	0	0	0	0	0	0	0		0
18606	5482	—	Consultant Computers	HP	Nov-88	Sep-95	600	600	0	0	0	0	0	0	0	0	0		0
18609	5488	—	Job Training	Vocational Career	Jul-90	Sep-93	2,392	2,392	0	0	0	0	0	0	0	0	0		0
18611	5611		Legal Lien Fees	various	Jan-89	Jun-93	63	63	0	0	0	0	0	0	0	0	0		0
18612	5483		Professional Services	various	Oct-89	Jun-2000	4,992	3,826	1,166	87	87	87	87	348	420	398	0		0
18613	5635		Insur Gen Liab	Johnson Higgins	Jan-90	Jun-2000	2,334	1,109	1,225	168	0	0	500	668	177	186	194		0
18614	5636		Insur. Builders Risk	Alex & Alex	Jan-90	Jun-2000	6,485	3,736	2,749	1,158	0	0	150	1,308	1,177	264	0		0
18631	5734		Insur Marine Liab	Johnson Higgins	Jan-90	Jun-96	422	422	0	0	0	0	0	0	0	0	0		0
18616	5553		Risk Management	Tillinghast	Sep-88	Dec-99	377	307	70	5	5	5	5	20	20	30	0		0
18620	5606		Labor Agree. Admn. Serv.	ML&B/FH&E	Jan-90	Jun-2000	3,078	2,407	671	33	33	33	33	132	196	343	0		0
18623	5713		Permit Fees	DEP	Jan-90	Dec-99	707	340	367	26	26	26	26	104	103	160	0		0
18624	5762		Outfall Admin	Smith Cur / Ch H&	Aug-90	Jun-97	3,017	3,017	0	0	0	0	0	0	0	0	0		0
18625	5763		Outfall Permits	various	Jul-90	Jan-98	100	0	100	0	0	100	0	100	0	0	0		0
18626	6029		Outfall Start-Up	TBS	Jan-98	Aug-98	10,000	108	9,892	0	0	3,509	3,577	7,086	2,806	0	0		0
18630	5764		Winthrop Easements	various	Jan-93	Dec-95	1,000	1,000	0	0	0	0	0	0	0	0	0		0
18632	5748		Building Permits	DEP	Jul-91	Jun-98	3,500	2,979	521	130	130	130	131	521	0	0	0		0
18633	5748		Misc. Facil Support	various	Sep-91	Jun-2000	3,466	1,915	1,551	148	148	148	148	592	500	459	0		0
18404	5457	CP-404	Winthrop Road Reconstruction	Town of Winthrop	Aug-93	Aug-94	1,602	1,602	0	0	0	0	0	0	0	0	0		0
18646	5581		MBE/WBE Assistance		Jul-96	Dec-96	250	250	0	0	0	0	0	0	0	0	0		0
18634	5865		Construction Safety	various	Apr-92	Jun-99	1,914	1,415	499	338	23	23	23	407	92	0	0		0
18640	5694		FO/RO - Rolling Stock	various	Mar-93	Jun-99	4,810	2,127	2,683	556	556	555	555	2,222	461	0	0		0
18641	5714		FO/RO - Furnishings	various	Mar-93	Jun-99	1,713	1,713	0	0	0	0	0	0	0	0	0		0
18642	5730		FO/RO - Shop & Maint. Equip.	various	Mar-93	Jun-99	1,770	1,253	517	144	144	0	0	288	229	0	0		0
18643	5781		FO/RO - Lab. Equip.	various	Mar-93	Jun-99	2,526	2,267	259	0	0	0	0	0	259	0	0		0
18644	5782		FO/RO - Audio/Visual/ Supplies	various	Aug-93	Jun-99	158	158	0	0	0	0	0	0	0	0	0		0
18645	5783		FO/RO - Misc. Fit Out/Supplies	various	Mar-93	Jun-99	1,377	1,377	0	0	0	0	0	0	0	0	0		0
			Phase Total:				$349,860	$270,447	$79,413	$10,031	$8,355	$11,365	$11,908	$41,659	$28,655	$8,906	$194	$0	$0
LEAD DESIGN SERVICES																			
18500	5534	—	LDE Services	M & E	Aug-88	Dec-98	$87,011	$82,911	$4,100	$704	$682	$679	$679	$2,744	$1,356	$0	$0		$0
18607	5487		Cadd I	McdonnelDouglas	Aug-88	Mar-93	5,475	5,475	0	0	0	0	0	0	0	0	0		0
18629	5721		Cadd II	McdonnelDouglas	Jul-89	Jun-99	3,554	2,619	935	134	134	135	135	538	397	0	0		0
18609	5486	—	Geotechnical Services	Warren George	May-89	Oct-89	9,707	9,707	0	0	0	0	0	0	0	0	0		0
18541	5575		Engineering Svc's During Construct	various	Apr-93	Jun-99	2,950	1,045	1,905	312	312	283	283	1,190	715	0	0		0
			Phase Total:				$108,697	$101,757	$6,940	$1,150	$1,128	$1,097	$1,097	$4,472	$2,468	$0	$0	$0	$0

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SITE FACILITY DESIGN																			
18601	5528	DP-1	Early Site Prep	Bryant	Oct-88	Mar-89	$3,174	$3,174	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18607	5488	DP-7	Support Buildings Ph. I	Tsoi/Kobus	Sep-90	Jan-96	6,683	6,683	0	0	0	0	0	0	0	0	0		0
18627	5829	DP-27	D.I. Haz Waste Eng Svcs	HMM /Earthtech	Feb-90	May-95	2,805	2,805	0	0	0	0	0	0	0	0	0		0
18663	6049	DP-34	D.I. Haz Waste Eng Svcs II	Green Environmen	May-95	Apr-98	502	318	184	39	39	39	39	156	28	0	0		0
			Phase Total:				$13,164	$12,980	$184	$39	$39	$39	$39	$156	$28	$0	$0	$0	$0
PRETREATMENT & PRIMARY DESIGN																			
18604	5632	DP-4	Nut Island Headworks	Havens&Emers	Jun-90	Feb-97	$8,145	$8,145	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18605	5494	DP-5	Inter-Island Tunnel	Sverdrup	Feb-89	Jun-97	4,980	4,876	104	104	0	0	0	104	0	0	0		0
18609	5529	DP-9	Primary Phase I	Malcom Pirnie	Jun-89	Sep-96	10,682	10,682	0	0	0	0	0	0	0	0	0		0
			Phase Total:				$23,807	$23,703	$104	$104	$0	$0	$0	$104	$0	$0	$0	$0	$0
SECONDARY DESIGN																			
18606	5631	DP-6	Effluent Outfall Tunnel	Parsons	Feb-89	Oct-98	$9,149	$8,298	$851	$173	$173	$173	$173	$692	$159	$0	$0		$0
18638	5670	DP-38	Ancil. D. I. Mods Design	Sverdrup	Apr-93	Jun-97	4,266	4,266	0	0	0	0	0	0	0	0	0		0
18618	5803	DP-19	Pilot Plant	CDM	Jan-91	Jul-91	425	425	0	0	0	0	0	0	0	0	0		0
18628	5701	DP-28	Sec. Treat. Fac. Ph. 1&2	Malcom Pirnie	Jan-91	Dec-99	30,127	28,547	1,580	201	186	186	184	757	503	320	0		0
18628	5585	DP-29	Sec. Treat. Fac. Ph. 3	various	Jan-94	May-99	2,045	1,695	350	0	0	0	0	0	0	350	0		0
18640	5686	DP-40	Sec. Treat. Fac. Ph. 4	Metcalf & Eddy	Jun-95	Jun-2000	12,905	6,981	5,924	655	655	655	655	2,620	2,142	1,162	0		0
			Phase Total:				$58,917	$50,212	$8,705	$1,029	$1,014	$1,014	$1,012	$4,069	$2,804	$1,832	$0	$0	$0
ON-ISLAND RESIDUALS DESIGN																			
18613	5808	DP-13	Residuals Phase I	Black&Veatch	Nov-89	Mar-91	$10,436	$10,436	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18614	5738	DP-31	Res Proc PH I DSDC	Havens&Emers	Oct-91	Nov-96	6,132	6,132	0	0	0	0	0	0	0	0	0		0
18616	5758	DP-32	Res Proc Ph IA	CampDresMckee	Jun-90	Apr-97	7,869	7,869	0	0	0	0	0	0	0	0	0		0
			Phase Total:				$24,437	$24,437	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PERMANENT UTILITIES DESIGN																			
18603	5624	DP-3	Elec Distr Facilities	R.W. Beck	Feb-90	Apr-96	$3,459	$3,459	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18623	5812	DP-23	Pwr & Hyd Plnt/Desl Tnk	R.W. Beck	Oct-90	Jun-97	19,460	19,431	29	29	0	0	0	29	0	0	0		0
18625	5830	DP-26	Plant I & C and Commun.	EMA	Jun-90	Dec-97	9,096	8,039	1,057	271	268	262	256	1,057	0	0	0		0
18634	5485		Rev/Chel/Win Util. Lins	R.W. Beck	Dec-88	Aug-92	3,668	3,668	0	0	0	0	0	0	0	0	0		0
			Phase Total:				$35,683	$34,597	$1,086	$300	$268	$262	$256	$1,086	$0	$0	$0	$0	$0
CONSTRUCTION SUPPORT SERVICES DESIGN																			
18622	5607	DP-22	Const. Support Facil.	Lin Assoc.	Aug-89	Jun-90	$1,216	$1,216	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18624	5687		D.I Design Services	various	Mar-95	Sep-97	875	804	71	71	0	0	0	71	0	0	0		0
			Phase Total:				$2,091	$2,020	$71	$71	$0	$0	$0	$71	$0	$0	$0	$0	$0
			PROJECT TOTAL:				$3,044,643	$2,638,528	$406,117	$49,568	$45,395	$36,478	$47,657	$179,098	$163,099	$57,490	$6,430	$0	$0

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1205 WATER TRANSPORTATION FACILITIES																
DEER ISLAND																
18001 5523 CP-001 Marine Facilities @ DI	J.M. Cashman	Jul-88	Feb-90	$27,694	$27,694	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18061 5517 D.I. Pier:Sheet Pile	J.F. White	Jun-88	Nov-88	1,180	1,180	0	0	0	0	0	0	0	0	0		0
18082 5518 D.I. Pier:Pipe Pile	J.F. White	Jun-88	Oct-90	4,198	4,198	0	0	0	0	0	0	0	0	0		0
18067 5558 Res. Insp. DI. Per. Fac.	C.E. Macquire	May-91	Nov-91	12	12	0	0	0	0	0	0	0	0	0		0
18068 5487 Res. Insp. - D.I.	C.E. Macquire	Jul-88	Feb-90	1,311	1,311	0	0	0	0	0	0	0	0	0		0
Phase Total:				$34,395	$34,395	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FORE RIVER STAGING AREA (FRSA)																
18002 5524 CP-002 On-Shore Marine Fclty Quincy	J.M. Cashman	Apr-89	Apr-90	$6,966	$6,966	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18010 5894 CP-010 Asbestos & Elec Cbl Rmvl, FRSA	N.Amer Site	Apr-90	Jul-90	423	423	0	0	0	0	0	0	0	0	0		0
18011 5508 CP-011 Demolition @FRSA	Diprizio	Jun-90	Aug-90	240	240	0	0	0	0	0	0	0	0	0		0
18012 5514 CP-012 Marine & On-Shore Fac FRSA	J.M. Cashman	Sep-91	Jul-92	5,770	5,770	0	0	0	0	0	0	0	0	0		0
18072 5879 FRSA Railroad	J.F. White	Sep-91	Jul-92	839	839	0	0	0	0	0	0	0	0	0		0
18817 5890 Land FRSA	GeneralDynamic	Jan-88	Dec-90	50,895	50,895	0	0	0	0	0	0	0	0	0		0
18073 5841 FRSA Utilities	Mass Electric	Jan-92	Jun-99	886	594	292	41	41	41	41	164	128	0	0		0
Phase Total:				$66,019	$65,727	$292	$41	$41	$41	$41	$164	$128	$0	$0	$0	$0
SQUANTUM POINT																
18005 5831 CP-005 Dredging at Squantum Point	J.M. Cashman	Jan-90	Feb-90	$417	$417	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18013 5598 CP-013 Per Ferry @Squantum Pt Pk	RDA	May-90	Jul-90	1,642	1,642	0	0	0	0	0	0	0	0	0		0
18014 5834 CP-014 Upland Fcity @Squantum Pt	Reynolds	Aug-90	May-91	1,960	1,960	0	0	0	0	0	0	0	0	0		0
18016 5737 CP-016 Squantum Point Inter Imprv	Quincy	Jan-93	Dec-94	1,049	1,049	0	0	0	0	0	0	0	0	0		0
18064 5732 Sq. Pt. Maintenance	MB - Access Corp.	Apr-91	Dec-99	850	574	276	24	24	24	24	96	47	133	0		0
18818 5477 Squantum Point Lease	MDC	Apr-91	Dec-99	3,261	3,261	0	0	0	0	0	0	0	0	0		0
Phase Total:				$9,179	$8,903	$276	$24	$24	$24	$24	$96	$47	$133	$0	$0	$0
REVERE SUGAR																
18009 5726 CP-009 Christwn Demo. Rehab&Frry Trm	Reynolds	Feb-92	Aug-92	$2,443	$2,443	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18063 5886 Asbestos - Revere Sugar	Dec - Tam	Jul-91	Dec-91	483	483	0	0	0	0	0	0	0	0	0		0
18819 5576 Revere Sugar Lease	Massport	Aug-88	Oct-94	2,234	2,234	0	0	0	0	0	0	0	0	0		0
Phase Total:				$5,160	$5,160	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

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NUT ISLAND																
19016 5719 CP-015 N.I. Dredging	Great Lake	Jan-91	Feb-91	$217	$217	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
19068 5533 Res. Insp. - N.I.	C.E. Maquire	Jan-89	Mar-90	588	588	0	0	0	0	0	0	0	0	0		0
18160 5515 CP-160 Marine Facilities @ NI	Sciaba	Jan-89	Mar-90	5,393	5,393	0	0	0	0	0	0	0	0	0		0
Phase Total:				$6,198	$6,198	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DESIGN																
19520 5596 DP-20 Water/Land Trans. Fac.	Fred Harris	Jun-89	Dec-90	$1,348	$1,348	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
18532 5519 Design - On Shore	Parson/Brink	Oct-87	May-90	2,496	2,496	0	0	0	0	0	0	0	0	0		0
18533 5521 Design - On Island	C.E. Maquire	Apr-87	Jun-88	3,433	3,433	0	0	0	0	0	0	0	0	0		0
18535 5735 DP-60 Sq. Pt. Inters. Design	Quincy	Mar-91	Jun-93	407	407	0	0	0	0	0	0	0	0	0		0
18537 5764 DP-37 D.I. Pier Improvements	F.R. Harris	May-92	Dec-92	63	63	0	0	0	0	0	0	0	0	0		0
Phase Total:				$7,747	$7,747	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WTS OPERATIONS																
19908 5528 CP-908 Bus Transportation System	Modern	Jul-90	Dec-97	$22,965	$21,975	$990	$496	$494	$0	$0	$990	$0	$0	$0		$0
18827 CP-927 Bus Transport Sys 98-99	TBS	Jan-98	Dec-2000	4,173	0	4,173	0	0	379	379	758	1,401	1,343	671		0
18907 5610 CP-907 WTS RO/RO Transport Op 89-97	Bos Tow/Tra	Nov-89	Dec-97	38,674	36,064	2,610	1,310	1,300	0	0	2,610	0	0	0		0
19925 CP-925 WTS RO/RO Transport Op 98-99	TBS	Jan-98	Dec-2000	9,261	0	9,261	0	0	772	772	1,544	3,088	3,088	1,541		0
18918 5891 CP-919 WTS-Personl Trans Op 89-97	Modern	Dec-89	Dec-97	31,969	30,576	1,393	702	691	0	0	1,393	0	0	0		0
18926 CP-926 WTS-Personl Trans Op 98-99	TBS	Jan-98	Dec-2000	4,777	0	4,777	0	0	596	596	1,192	1,866	1,348	371		0
Phase Total:				$111,819	$88,615	$23,204	$2,508	$2,485	$1,747	$1,747	$8,487	$6,356	$5,779	$2,583	$0	$0
OTHER WTS																
17980 5965 Technical Assistance WTS	WTS	Apr-90	On-Going	$308	$308	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0
17889 5525 Fac. Plan/EIR	C.E. Maquire	Jan-88	Dec-90	1,875	1,875	0	0	0	0	0	0	0	0	0		0
17891 5889 Appraisal Service	LeggatMcCall	Jul-88	Mar-89	25	25	0	0	0	0	0	0	0	0	0		0
17993 5892 Haz. Waste Tests/Rev.	NUS	Jan-88	Mar-89	934	934	0	0	0	0	0	0	0	0	0		0
17994 5505 Historical Surveys	Boston Aff.	Jan-88	Dec-90	27	27	0	0	0	0	0	0	0	0	0		0
18007 5893 CP-007 Bus Term & Prkg @ Suffolk Downs	Reynolds	Aug-90	May-91	341	341	0	0	0	0	0	0	0	0	0		0
18019 5836 Rowes Wharf Permit	Commer Maritime	Aug-92	Jun-98	49	25	24	6	8	6	6	24	0	0	0		0
18070 5987 Bus Sites Appraisal	Meriddith	Jan-89	Mar-90	18	18	0	0	0	0	0	0	0	0	0		0
19822 5627 Suffolk Downs Land Lease	Belle Isle	May-89	May-99	5,487	5,039	448	57	57	57	57	228	220	0	0		0
18019 5456 CP-948 Maintenence Dredging	TBS	Jan-96	Dec-97	540	404	136	68	68	0	0	136	0	0	0		0
Phase Total:				$9,604	$8,996	$608	$131	$131	$63	$63	$388	$220	$0	$0	$0	$0
PROJECT TOTAL:				$260,121	$225,741	$24,380	$2,704	$2,681	$1,876	$1,876	$9,135	$6,760	$5,912	$2,583	$0	$0
SUB-TOTAL: BHP				$3,294,764	$2,864,267	$430,497	$52,372	$48,076	$38,353	$49,432	$188,233	$199,849	$63,402	$9,013	$0	$0
TOTAL: TREATMENT				$3,324,367	$2,871,357	$453,010	$52,826	$49,076	$38,626	$50,417	$191,943	$185,797	$66,709	$9,481	$100	$0

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
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C. RESIDUALS																
1301 RESIDUALS MANAGEMENT FACILITIES																
25941 5667 **Des/CS Pelletizing 1**	Tighe & Bond	Aug-93	Jan-96	$5,942	$5,072	$870	$187	$186	$187	$187	$747	$123				$0
25948 5669 **Fast Track Equip. Prepurc**	TBS	Aug-94	Jun-95	302	302	0					0					0
26055 6009 **Fast Track Equip. Installati**	ThomasO'Connor	Oct-94	Jun-95	1,457	1,457	0					0					0
26056 6010 **Outside Construction**	Poole & Kent Co.	Jan-96	Jul-97	13,195	13,172	23	23				23					0
26057 6011 **Inside Equip Prepurchase**	Alfa Laval Sep. Inc.	May-95	Dec-97	4,638	3,943	695	339	356			695					0
26058 6012 **Inside Construction**	TBS	Nov-96	Aug-98	28,922	9,029	19,893	3,945	4,157	4,125	3,781	16,008	3,885				0
25961 5643 **Resid Research**	UMASS Amherst	Aug-90	Dec-96	443	443	0					0					0
26059 6083 **License Fee**	Enviro-gro	Jan-01	Jan-03	675	0	675					0			225	225	225
25968 **Royalty**	TBS	Feb-96	Dec-96	562	562	0					0					0
Project Total:				$56,136	$33,980	$22,156	$4,494	$4,699	$4,312	$3,968	$17,473	$4,008	$0	$225	$225	$225
1399 FINAL PAYMENT & RELEASE																
25926 5969 **Technical Assistance**	Various			$1,294	$1,294	$0					$0					$0
25917 5652 **EIR/Des/FP/CS/RI - Pellet**	NE Fertilizer			15,730	15,730	0					0					0
25919 5645 **Constr-FSRA Facilty**	Kiewit Eastern			62,761	62,761	0					0					0
25920 5646 **Constr-FSRA Pier**	J. Mahoney			4,201	4,201	0					0					0
25936 5664 **Facilities Planning**	Black & Veatch			9,630	9,630	0					0					0
25969 5653 **Stdy-Alternative Lndfl**	W. C. Finn			250	250	0					0					0
25972 5670 **Emergency Plan**	R. Weston			94	94	0					0					0
25943 5672 **Design Landfill 1**	ENSR			4,426	4,426	0					0					0
Project Total:				$98,386	$98,386	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sub-total: RESIDUALS				$154,522	$132,366	$22,156	$4,494	$4,699	$4,312	$3,968	$17,473	$4,008	$0	$225	$225	$225

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APL-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
D. CSO's																
1401 CSO CONTROL PROGRAM																
32400 5790 Consult Tech Asst	CH2M-Hill	Mar-86	Feb-88	$228	$228	$0					$0					$0
32401 5791 Planning/EIR	CH2M-Hill	Mar-88	Sep-90	10,769	10,769	0					0					0
32403 5716 Master Planning	Metcalf & Eddy	Mar-92	Sep-97	17,187	17,157	30	30				30					0
32645 6036 Watershed Planning	CRWA	Dec-94	Oct-99	569	409	160		80			80	80				0
32409 5795 Modeling	MIT	May-92	Oct-94	300	300	0					0					0
32411 5767 SOP Program	Boston Water/Sew	Jan-94	Jun-2000	4,733	2,748	1,985	155	178	155	270	758	613	614			0
32407 5970 Technical Assistance	various	Mar-88	Feb-2010	61	61	0					0					0
North Dorchester Bay Consolidation Conduit, Reserved Channel Consolidation Conduit, & Reserved Channel Pumping Facility																
Design/CS/RI	TBS	Jul-97	Mar-2005	22,674	0	22,674	228	453	907	1,358	2,946	6,229	2,143	2,817	3,740	4,799
Construction 1	TBS	Mar-2003	Mar-2005	60,986	0	60,986					0			24,395	21,955	14,636
Construction 2	TBS	Sep-2000	Mar-2003	32,744	0	32,744					0			13,098	11,788	7,858
Construction 3	TBS	Sep-2000	Mar-2003	19,626	0	19,626					0					19,626
South Dorchester Bay Sewer Separation (Fox Point BOS088-089)																
32651 6155 Design/CS/RI	TBS	Jun-96	Sep-2007	6,160	1,786	4,374		239			239	363	488	595	621	2,068
Construction	TBS	Nov-98	Sep-2007	30,648	0	30,648		264			264	1,592	2,951	4,098	4,378	17,365
South Dorchester Bay Sewer Separation (Commercial Point BOS090)																
32650 6154 Design/CS/RI	TBS	Jun-96	Nov-2008	9,084	2,140	6,944		206			206	382	633	923	931	3,869
Construction	TBS	Apr-99	Nov-2008	49,054	0	49,054					0	1,703	3,977	6,251	6,666	30,457
Neponset River Sewer Separation																
32652 6156 Design/CS/RI	TBS	Jan-95	Jun-2000	1,732	879	853		283			283	379	191			0
32653 6160 Construction	TBS	Apr-98	Jun-2000	7,277	0	7,277		2,426			2,426	3,233	1,618			0
Constitution Beach Sewer Separation																
32649 6153 Design/CS/RI	TBS	Jan-97	Oct-2000	1,425	409	1,016		322			322	328	366			0
Construction	TBS	Apr-99	Oct-2000	7,466	0	7,466					0	3,537	3,929			0
Stony Brook Screening and Disinfection Facility Cambridge CAM005 Hydraulic Relief, Charlestown BOS017 Hydraulic Relief																
Design/CS/RI	TBS	Jul-97	Mar-2002	3,694	0	3,694	66	162	287	327	842	1,022	446	789	585	10
Construction #1	TBS	Mar-99	Mar-2000	2,758	0	2,758					0	1,017	1,735	6		0
Construction #2	TBS	Mar-2000	Mar-2002	15,704	0	15,704					0		5,026	7,696	2,982	0

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APL-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
Interception Connection BOS032																
Design/CS/RI	TBS	Jan-98	Jun-00	176	0	176		91			91	42	43			0
Construction	TBS	Jul-99	Jun-00	918	0	918					0	459	459			0
Cambridge CAM002-004 Sewer Separation																
32654 6161 Design/CS/RI	TBS	Jan-97	Jan-2000	1,943	1,001	942		297			297	595	50			0
Construction	TBS	Jul-98	Jan-2000	10,129	0	10,129		3,199			3,199	6,397	533			0
East Boston Branch Sewer Relief																
Design/CS/RI	TBS	Mar-2000	Sep-2005	5,350	0	5,350					0		54	1,198	1,331	2,767
Construction	TBS	Mar-2003	Sep-2005	26,752	0	26,752					0					26,752
Fort Point Channel Storage Conduit Charlestown BOS019 Storage Conduit																
Design/CS/RI	TBS	Jul-2002	Mar-2007	2,502	0	2,502					0					2,502
Construction 1	TBS	Mar-2005	Mar-2007	10,430	0	10,430					0					10,430
Construction 2	TBS	Mar-2005	Sep-2006	2,083	0	2,083					0					2,083
Chelsea Trunk Sewer Relief, Chelsea Branch Sewer Relief, Chelsea CHE008 Outfall Improvements																
Design/CS/RI	TBS	Jul-97	Jun-2001	4,878	0	4,878	74	207	428	469	1,178	1,248	1,153	1,280	19	0
Construction #1	TBS	Sep-99	Aug-2000	3,206	0	3,206					0		2,564	642		0
Construction #2	TBS	Dec-99	Jun-2001	21,175	0	21,175					0		11,011	10,164	0	0
Union Park Detention Treatment Facility					0	0					0					
Design/CS/RI	TBS	Dec-99	Mar-2005	4,366	0	4,366					0		134	1,046	954	2,232
Construction	TBS	Mar-2003	Mar-2005	21,831	0	21,831					0					21,831
BWSC Floatables Controls																
32657 6168 Design/CS/RI	TBS	Jan-98	May-2001	170	14	156		36			36	42	55	23		0
Construction	TBS	Dec-99	May-2001	879	0	879					0	49	586	244		0
Cambridge Floatables Controls																
32655 6162 Design/CS/RI	TBS	Jan-97	May-2001	65	0	65		16			16	19	21	9		0
Construction	TBS	Dec-99	May-2001	334	0	334					0	18	223	93		0
Upgrade Existing CSO Facilities and MWRA Floatables Control																
32647 6123 Design/CS/RI	CDM	Jun-96	Oct-99	2,749	1,596	1,153	126	395	316	158	995	105	53	0	0	0
Construction #1	TBS	Oct-97	Oct-99	7,685	0	7,685	0	2,305	2,305	1,536	6,146	1,154	385	0	0	0
Construction #2	TBS	Jul-97	Apr-99	2,902	0	2,902	871	871	580	435	2,757	145	0	0	0	0
Construction #3	TBS	Oct-97	Oct-99	271	0	271	0	109	81	26	216	44	11	0	0	0
32648 6150 Technical Review	TBS	Jul-96	Dec-2009	535	34	501	11	10	10	10	41	40	40	40	40	300
Financial Audit	TBS	Apr-98	Sep-2009	1,500	0	1,500			36	107	143	108	143	108	143	855
32658 6169 Land/Easement	TBS	Jul-96	Jun-05	15,000	64	14,936	32	82	33	108	255	5,105	3,730	2,656	2,900	290
Sub-total: CSOs				$462,708	$39,595	$413,113	$1,693	$12,231	$5,138	$4,804	$23,766	$36,048	$45,365	$78,171	$59,033	$170,730

PROPOSED WASTEWATER IMPROVEMENT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

PROJECT	Project Participants	Begin	End	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
E: OTHER PROGRAMS																
1501 I/I PROGRAM Community Financial Assistance																
10232 5330 GRANT (25%)	Communities	May-93	May-95	$5,766	$5,766	$0					$0					$0
10233 5393 LOAN (75%)	Communities	May-93	May-95	17,150	17,150	0					0					0
10234 5394 REPAYMENT	Communities	May-94	May-2002	(17,150)	(9,180)	(7,970)	(750)	(750)	(750)	(750)	(3,000)	(2,000)	(1,000)	(1,000)	(970)	0
10273 6084 GRANT (25%)	Communities	Jul-95	Jun-2005	10,171	2,788	7,383	250	250	250	250	1,000	1,000	1,500	1,500	1,500	883
10274 6085 LOAN (75%)	Communities	Jul-95	Jun-2005	30,514	8,365	22,149	750	750	750	750	3,000	3,000	4,500	4,500	4,500	2,649
REPAYMENT	Communities	Jul-96	Jun-2010	(30,514)	(1,093)	(29,421)	(289)	(150)	(582)	(645)	(1,666)	(2,266)	(2,866)	(3,766)	(3,574)	(15,283)
Project Total:				**$15,937**	**$23,796**	**($7,859)**	**($39)**	**$100**	**($332)**	**($395)**	**($666)**	**($266)**	**$2,134**	**$1,234**	**$1,456**	**($11,751)**
1599 FINAL PAYMENTS & RELEASE OF RETAINAGE																
92217 5946 BHS-MIT				$217	$217	$0					$0					$0
92213 5943 BHS-UMASS	UMass-Amherst			267	267	0					0					$0
Project Total:				**$484**	**$484**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Sub-total: OTHER PROGRAMS				**$16,421**	**$24,280**	**($7,859)**	**($39)**	**$100**	**($332)**	**($395)**	**($666)**	**($266)**	**$2,134**	**$1,234**	**$1,456**	**($11,751)**
TOTAL WASTEWATER				**$4,360,557**	**$3,261,305**	**$1,099,252**	**$65,389**	**$72,756**	**$55,668**	**$63,628**	**$257,439**	**$247,222**	**$176,286**	**$151,618**	**$85,126**	**$181,561**

WASTEWATER GRANT RECEIPTS AND LOAN FUND PROJECTIONS

FISCAL YEARS 1998 - 2000

WASTEWATER CONSTRUCTION
GRANT RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM:		REGULAR GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
A. INTERCEPTION AND PUMPING:															
1102 BRAINTREE-WEYMOUTH R.F.															
5311	C	Fac Plan Phase 1	$288	$288	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Project Total:	**$288**	**$288**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
1103 NEW NEPONSET VALLEY R.S.															
5380	C	Facilities Plan (State)	$408	$408	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5381	C	EIR/Supp. Fac Plan (State)	478	478	0	0	0	0	0	0	0	0	0	0	0
		Project Total:	**$887**	**$887**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
1105 WELLESLEY EXTENSION R.S.															
5345	C	Study	$324	$324	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5346	C	Design/EIR/CS/RI	6,033	5,330	703	0	691	0	12	703	0	0	0	0	0
5349	C	Construction 1	12,082	11,232	850	0	630	0	219	850	0	0	0	0	0
5351	C	Construction 2	4,336	4,236	100	0	84	0	16	100	0	0	0	0	(0)
5434	C	Construction 3	6,164	5,675	489	0	234	0	255	489	0	0	0	0	(0)
5350	C	Construction 4	4,339	4,176	163	0	31	0	132	163	0	0	0	0	(0)
5431	C	Construction 5	4,837	4,646	191	0	70	0	121	191	0	0	0	0	(0)
5433	C	Construction 7	10,955	0	10,955	0	4,260	0	6,695	10,955	0	0	0	0	0
		Project Total:	**$49,070**	**$35,619**	**$13,451**	**$0**	**$6,002**	**$0**	**$7,449**	**$13,451**	**$0**	**$0**	**$0**	**$0**	**$0**
1106 FRAMINGHAM EXTENSION R.S.															
5318	C	Fac Plan Update/EIR	$742	$742	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5319	C	Design/CS/RI	400	400	0	0	0	0	0	0	0	0	0	0	0
		Project Total:	**$1,142**	**$1,142**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

WASTEWATER CONSTRUCTION
GRANT RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM:		REGULAR GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
FINAL PYMNTS & REL. RETAINAGE															
5360	C	Design - East Boston	$1,155	$1,155	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5361	C	RI - East Boston	3,892	3,892	0	0	0	0	0	0	0	0	0	0	0
5399	C	Study/Design - Metering	1,121	1,090	31	0	0	0	31	31	0	0	0	0	0
5395	C	Construction 3 - Metering	169	0	169	0	0	0	169	169	0	0	0	0	0
5355	C	Design/RI - Charlestown	2,168	2,168	0	0	0	0	0	0	0	0	0	0	0
5357	C	Constr. - Charlestown	14,038	14,038	0	0	0	0	0	0	0	0	0	0	(0)
		Project Total:	$22,543	$22,343	$200	$0	$0	$0	$200	$200	$0	$0	$0	$0	$0
SUBTOTAL: INT & PUMP			$73,929	$60,278	$13,651	$0	$6,002	$0	$7,650	$13,651	$0	$0	$0	$0	$0
COMPLETED PROJECTS															
5398	C	Construction 1 - Metering	$2,530	$2,460	$70	$0	$0	$0	$70	$70	$0	$0	$0	$0	$0
5401	C	Construction 2 - Metering	584	584	0	0	0	0	0	0	0	0	0	0	(0)
5396	C	S. System Study (State)	1,639	1,639	0	0	0	0	0	0	0	0	0	0	0
5397	C	S. System Equipment (St)	627	627	0	0	0	0	0	0	0	0	0	0	(0)
5362	C	East Boston - Con	17,522	17,522	0	0	0	0	0	0	0	0	0	0	0
5363	C	East Boston - Winth.Term.	6,839	6,839	0	0	0	0	0	0	0	0	0	0	0
5364	C	East Boston - Chel S.H.	6,780	6,780	0	0	0	0	0	0	0	0	0	0	0
Sub-Total: COMPLETED PROJECTS			$36,522	$36,451	$70	$0	$0	$0	$70	$70	$0	$0	$0	$0	$0
B. TREATMENT: 1204 D.I. PRIM. & SEC. TREATMENT FACILITY															
5526	CDM	Facilities Plan	$9,657	$9,288	$369	$0	$0	$0	$369	$369	$0	$0	$0	$0	$0
		Project Total:	$9,657	$9,288	$369	$0	$0	$0	$369	$369	$0	$0	$0	$0	$0

WASTEWATER CONSTRUCTION
GRANT RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM:		REGULAR GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
1205 WATER TRANSPORTATION FACS.															
5523	CP-001	Marine Facilities @ DI	$23,827	$23,827	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5517		D.I. Pier:Sheet Pile	1,062	1,062	0	0	0	0	0	0	0	0	0	0	0
5518		D.I. Pier:Pipe Pile	3,778	3,778	0	0	0	0	0	0	0	0	0	0	0
5497		Res. Insp. - D.I.	928	928	0	0	0	0	0	0	0	0	0	0	0
				0	0										
5521		Design - On-Island	639	639	0	0	0	0	0	0	0	0	0	0	0
		Project Total:	$30,234	$30,234	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FINAL PYMNTS & REL. RETAINAGE															
5440	C	Design/CS - Clinton	$2,858	$2,858	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5561	C	NI Immed Design (State)	312	312	0	0	0	0	0	0	0	0	0	0	0
		Project Total:	$3,170	$3,170	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sub-total: TREATMENT			$43,061	$42,692	$369	$0	$0	$0	$369	$369	$0	$0	$0	$0	$0
COMPLETED PROJECTS:															
5512	C	DI Electrical Upgrade	$209	$209	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5513	C	DI Electrical Upgrade	1,599	1,559	40	0	0	0	0	0	40	0	0	0	0
5452	C	DI P&P Constr	23,607	21,159	2,448	0	0	0	0	0	2,448	0	0	0	0
5453	C	DI P&P Constr Svs	2,631	2,287	344	0	0	0	0	0	344	0	0	0	0
5451		DI P&P Design Allow	1,062	1,062	0	0	0	0	0	0	0	0	0	0	0
5491		DI Sludge Thick Con	1,564	1,564	0	0	0	0	0	0	0	0	0	0	0
5443	C	Construction 1 - Clinton	29,067	29,067	(0)	0	0	0	0	0	0	0	0	0	(0)
5444		Construction 2 - Clinton	433	433	0	0	0	0	0	0	0	0	0	0	0
5250		Clinton Design	1,333	1,333	0	0	0	0	0	0	0	0	0	0	0
5563		NI Immed Upgrade Con	784	784	0	0	0	0	0	0	0	0	0	0	0
5564		NI Immed Upgrade Con	164	164	0	0	0	0	0	0	0	0	0	0	0
5565		NI Immed Upgrade Con	812	812	0	0	0	0	0	0	0	0	0	0	0
5566		NI Immed Upgrade Con	2,704	2,704	0	0	0	0	0	0	0	0	0	0	0
Sub-Total: COMPLETED PROJECTS			$65,968	$63,136	$2,832	$0	$0	$0	$0	$0	$2,832	$0	$0	$0	$0

WASTEWATER CONSTRUCTION
GRANT RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM: REGULAR GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
C. RESIDUALS													
COMPLETED PROJECTS:													
5662 C Phase 1 Study	$354	$354	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		0	0										
D. CSOs		0	0										
		0	0										
1401 CSO CONTROL PROGRAM		0	0										
		0	0										
5791 C Planning/EIR (State)	1,122	1,122	0	0	0	0	0	0	0	0	0	0	0
		0	0										
COMPLETED PROJECTS:		0	0										
		0	0										
5755 C Comm Pt Design/CS	129	129	0	0	0	0	0	0	0	0	0	0	0
5759 C Comm Pt Construction	4,515	4,515	0	0	0	0	0	0	0	0	0	0	(0)
Project Total:	$4,644	$6,119	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
2301 WATER METER MODERNIZATION													
5710 Construction 1 (State)	$755	$0	$755	$0	$0	$0	$755	$755	$0	$0	$0	$0	$0
		0	0										
Sub-total: DISTRIBUTION AND PUMPING	$755	$0	$755	$0	$0	$0	$755	$755	$0	$0	$0	$0	$0
REGULAR GRANTS GRAND TOTAL	$226,355	$210,152	$17,678	$0	$6,002	$0	$8,844	$14,846	$2,832	$0	$0	$0	$0

WASTEWATER SPECIAL FEDERAL GRANTS
GRANT RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM:	$200 MILLION GRANT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
B. TREATMENT														
1204 D.I. PRIMARY & SECONDARY TREATMENT FACILITY														
5700 CP-105	**Primary Clarifier Battery A&B**	$30,558	$27,811	$2,746	$2,746	$0	$0	$0	$2,746	$0	$0	$0	$0	$0
5742 CP-130	**Primary Clarifier Battery C&D**	43,962	42,998	965	965	0	0	0	965	0	0	0	0	(0)
5850 CP-152	**Nut Island Headworks**	34,745	30,803	3,942	76	76	76	365	593	1,611	1,737	0	0	0
SECONDARY CONSTRUCTION														
5484 CP-202	**Secondary Reactor Bttry A&B**	53,342	50,688	2,655	0	0	2,655	0	2,655	0	0	0	0	(0)
5744 CP-204	**Disinfect Fclty/Phase I Seawall**	20,259	18,881	1,378	1,378	0	0	0	1,378	0	0	0	0	(0)
PRETREATMENT & PRIMARY DESIGN														
5532 DP-4	**Nut Island Headworks**	1,371	1,371	0	0	0	0	0	0	0	0	0	0	0
5529 DP-9	**Primary Phase I**	2,819	2,819	0	0	0	0	0	0	0	0	0	0	0
SECONDARY DESIGN														
5701 DP-28	**Sec. Treat. Fac. Ph. 1&2**	3,130	3,130	0	0	0	0	0	0	0	0	0	0	0
	Unallocated Revenues	9,814	0	9,814	5,087	0	2,863	0	7,949	0	1,865	0	0	0
$200M GRANT TOTAL:		**$200,000**	**$178,500**	**$21,499**	**$10,251**	**$76**	**$5,594**	**$365**	**$16,287**	**$1,611**	**$3,602**	**$0**	**$0**	**($0)**

WASTEWATER FEDERAL GRANT RECEIPTS
FORECAST FY 1998 - 2007
($000)

PROGRAM: "513" GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
1204 D.I. PRIMARY & SECONDARY TREATMENT FACILITY													
FACILITIES PLANNING													
5535 Facilities Plan	$2,265	$2,265	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SITE FACILITIES CONSTRUCTION													
5536 CP-020 Asbestos Rmvl Ft Dawes-SPS	501	501	0	0	0	0	0	0	0	0	0	0	0
5599 CP-021 Demo Ft. Dawes Bunkers	3,443	3,443	0	0	0	0	0	0	0	0	0	0	0
5600 CP-023 Pump Sta Mods & Sewers	3,955	3,955	0	0	0	0	0	0	0	0	0	0	0
PROJECT TOTAL	$7,899	$7,899	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PRETREATMENT & PRIMARY CONSTRUCTION													
5541 CP-151 Inter-Island Tunnel	$45,306	$45,306	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CONSTRUCTION MANAGEMENT													
5535 P/CM Services	167	167	0	0	0	0	0	0	0	0	0	0	0
LEAD DESIGN SERVICES													
5486 Geotech Srvcs Marine Boring	7,280	7,280	0	0	0	0	0	0	0	0	0	0	0
SITE FACILITIES DESIGN													
5528 DP-1 Early Site Prep	658	658	0	0	0	0	0	0	0	0	0	0	0
SECONDARY DESIGN													
5531 DP-6 Effluent Outfall Tunnel	3,315	3,315	0	0	0	0	0	0	0	0	0	0	0
PROJECT TOTAL	$66,890	$66,890	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

WASTEWATER FEDERAL GRANT RECEIPTS
FORECAST FY 1998 - 2007
($000)

PROGRAM: "513" GRANTS PROJECT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
1205 WATER TRANSPORTATION FAC.													
REVERE SUGAR													
5895 Asbestos - Revere Sugar	$362	$362	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NUT ISLAND													
5533 Res. Insp. - N.I.	380	380	0	0	0	0	0	0	0	0	0	0	0
5515 CP-150 Marine Facilities @ NI	3,964	3,964	0	0	0	0	0	0	0	0	0	0	0
	4,344	4,344	0	0	0	0	0	0	0	0	0	0	0
DESIGN													
5521 Design - On Island Marine	348	348	0	0	0	0	0	0	0	0	0	0	0
PROJECT TOTAL	$5,054	$5,054	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
BHP Total	$71,944	$71,944	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sub-total: TREATMENT	$71,944	$71,944	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
D. CSO's													
1401 CSO CONTROL PROGRAM													
5791 P Planning/EIR	$457	$457	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
5716 P Master Planning	913	913	(0)	0	0	0	0	0	0	0	0	0	(0)
Project Total:	$1,370	$1,370	($0)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
Sub-total: CSO's	$1,370	$1,370	($0)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
COMPLETED PROJECTS													
5755 P Comm Pt Design/CS	$228	$228	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5759 P Comm Pt Design/Construction	868	868	0	0	0	0	0	0	0	0	0	0	0
Project Total:	$1,096	$1,096	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"513" GRANTS GRAND TOTAL:	$74,411	$74,410	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

WASTEWATER SPECIAL FEDERAL GRANT
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE: $250 MILLION GRANT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
B. TREATMENT													
SECONDARY CONSTRUCTION													
5492 CP-203 Clarifier Batteries A&B	$142,416	$130,627	$11,790	$4,203	$466	$0	$0	$4,669	$7,121	$0	$0	$0	$0
5493 CP-303 Residual Trt Fac. Phl Sec A&B	97,185	87,723	9,461	1,479	1,362	607	0	3,448	6,013	0	0	0	0
SECONDARY DESIGN													
5701 Design Allowance (CP-203)	5,090	5,090	0	0	0	0	0	0	0	0	0	0	0
5758 Design Allowance (CP-303)	3,532	3,532	0	0	0	0	0	0	0	0	0	0	0
Unallocated Revenue	1,777	0	1,777	0	0	0	0	0	1,777	0	0	0	0
$250M GRANT TOTAL:	**$250,000**	**$226,973**	**$23,028**	**$5,681**	**$1,828**	**$607**	**$0**	**$8,116**	**$14,911**	**$0**	**$0**	**$0**	**$0**

WASTEWATER SPECIAL FEDERAL GRANTS
RECEIPTS FORECAST FY 1998 - 2007
($000)

PROGRAM: $75 MILLION GRANT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
B. TREATMENT													
1204 D.I. PRIMARY & SECONDARY TREATMENT FACILITY													
SECONDARY CONSTRUCTION													
TBD CP-260 2ndary C Reactr & Clarifr Bat	$53,755	$2,175	$51,580	$3,288	$5,342	$7,037	$4,968	$20,635	$28,257	$0	$2,688	$0	$0
SECONDARY DESIGN													
5686 DP-32 CP-260 Design Allowance	3,349	3,349	0	0	0	0	0	0	0	0	0	0	0
C. RESIDUALS													
1301 RESIDUALS MANAGEMENT FACILITIES													
6012 Inside Construction	15,907	2,730	13,178	1,988	2,061	2,172	2,155	8,377	4,005	795	0	0	0
5667 Con.Serv./Res. Inspection	508	60	448	60	60	60	60	242	181	25	0	0	0
5667 Design Allowance/Ins.Con.	686	686	0	0	0	0	0	0	0	0	0	0	0
6012 Unallocated Contingency	795	0	795	0	0	0	0	0	0	795	0	0	0
$75M GRANT TOTAL:	$75,000	$8,999	$66,001	$5,337	$7,463	$9,269	$7,184	$29,253	$32,444	$1,616	$2,688	$0	$0

WASTEWATER SPECIAL FEDERAL GRANT
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE: $50 MILLION GRANT	Total Grant Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
1204 D.I. PRIMARY & SECONDARY TREATMENT FACILI	Y												
SITE FACILITIES CONSTRUCTION													
5474 CP-043 Late Site Prep/Demo Exist Plnt	$15,600	$15,600	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PRETREATMENT & PRIMARY CON.													
5541 CP-151 Inter-Island Tunnel	34,400	30,415	3,985	0	0	0	0	0	3,985	0	0	0	(0)
$50M GRANT TOTAL:	**$50,000**	**$46,015**	**$3,985**	**$0**	**$0**	**$0**	**$0**	**$0**	**$3,985**	**$0**	**$0**	**$0**	**($0)**

WASTEWATER STATE REVOLVING LOAN FUND
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE:		STATE REVOLVING LOAN FUND PROJECT	Total Loan Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
A. INTERCEPTION AND PUMPING															
1101 QUINCY PUMP FACILITIES															
5404	P	Design	$1,979	$1,411	$568	$188	$202	$178	$0	$567	$0	$0	$0	$0	$0
		Project Total:	$1,979	$1,411	$568	$188	$202	$178	$0	$567	$0	$0	$0	$0	$0
1103 NEW NEPONSET VALLEY R.S.															
5385	C	Construction 1	$5,163	$4,929	$233	$0	$233	$0	$0	$233	$0	$0	$0	$0	$0
5390	C	Construction 2	2,547	2,547	0	0	0	0	0	0	0	0	0	0	0
5834	C	Construction 3	3,264	3,264	(0)	0	0	0	0	0	0	0	0	0	(0)
5835	C	Construction 4	2,777	2,777	0	0	0	0	0	0	0	0	0	0	0
5389	C	Construction 5	9,550	9,072	478	0	477	0	0	477	0	0	0	0	0
		Project Total:	23,300	$22,589	$711	$0	$710	$0	$0	$710	$0	$0	$0	$0	$1
1106 FRAMINGHAM EXTENSION R.S.															
5319		Construction Serv./Res. Inspect.	$1,131	$909	$222	$151	$15	$0	$0	$165	$57	$0	$0	$0	$0
5320	C	Construction 1	7,081	6,296	785	431	0	0	0	431	354	0	0	0	(0)
5322	C	Construction 2	4,564	3,296	1,268	772	267	0	0	1,039	228	0	0	0	0
5323	C	Construction 3	3,793	2,122	1,671	1,130	351	0	0	1,481	190	0	0	0	0
		Project Total:	$16,569	$12,623	$3,946	$2,484	$633	$0	$0	$3,117	$828	$0	$0	$0	$0
1109 NORTH METRO TRUNK SEWER															
5339	C	Construction	$9,025	$5,744	$3,281	$1,910	$921	$0	$0	$2,831	$451	$0	$0	$0	($0)
		Unallocated Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0
		Project Total:	$9,025	$5,744	$3,281	$1,910	$921	$0	$0	$2,831	$451	$0	$0	$0	($0)
SUBTOTAL: INT & PUMP			$50,872	$42,366	$8,506	$4,582	$2,468	$178	$0	$7,225	$1,280	$0	$0	$0	$1

WASTEWATER STATE REVOLVING LOAN FUND
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE:	STATE REVOLVING LOAN FUND PROJECT	Total Loan Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
B. TREATMENT														
1204	D.I. PRIMARY & SECONDARY TREATMENT FACILITY													
SITE FACILITIES CONSTRUCTION														
5601	CP-022 Earthworks/Lndfl/Roadwys	$16,825	$16,825	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5640	CP-030 Disposal of Excess Till	14,077	14,077	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$30,903	$30,902	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PRETREATMENT & PRIMARY CONSTRUCTION														
5454	CP-160 Ancil.D.I.Mods. Phl	$10,246	$9,734	$512	$0	$512	$0	$0	$512	$0	$0	$0	$0	($0)
	Project Total:	$10,246	$9,734	$512	$0	$512	$0	$0	$512	$0	$0	$0	$0	($0)
SECONDARY CONSTRUCTION														
5637	CP-282 Effluent Outfall Tunnel-TBM	9,000	$9,000	$0	0	0	0	0	0	0	0	0	0	0
5637	CP-282 Effluent Outfall Tunnel-Shaft	15,355	15,355	0	0	0	0	0	0	0	0	0	0	0
5637	CP-282 Effluent Outfall Tunnel	75,000	75,000	0	0	0	0	0	0	0	0	0	0	0
5637	CP-282 Effluent Outfall Tunnel	49,608	49,608	0	0	0	0	0	0	0	0	0	0	0
5637	CP-282 Effluent Outfall Tunnel	44,647	44,647	0	0	0	0	0	0	0	0	0	0	0
5637	CP-282 Effluent Outfall Tunnel	40,000	28,319	11,681	0	0	0	0	0	11,681	0	0	0	(0)
	Project Total:	$233,610	$221,929	$11,681	$0	$0	$0	$0	$0	$11,681	$0	$0	$0	$0
PERMANENT UTILITIES CONSTRUCTION														
5615	CP-401 Off Island Water Line	$9,350	$9,350	($0)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
5710	CP-427 Mn 13.8 Swgr,Bld&Dist/Yd Util.	20,388	20,388	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$29,738	$29,738	($0)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)

WASTEWATER STATE REVOLVING LOAN FUND
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE:	STATE REVOLVING LOAN FUND PROJECT	Total Loan Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
CONSTRUCTION SUPPORT SERVICES														
5696	CP-902 Construction Rds & Utilities	$5,113	$5,113	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5695	CP-903 Fuel Facility	1,658	1,658	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$6,771	$6,770	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CONSTRUCTION MANAGEMENT														
5535	P/CM Services (D.I.ESP)	$220	$220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5622	P/CM Services (D.I.ESP)	458	458	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$678	$678	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
1205	WATER TRANSPORTATION FAC.													
FORE RIVER STAGING AREA (FRSA)														
5524	CP-002 On-Shore Marine Fclty Quincy	$6,966	$6,966	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5894	CP-010 Asbestos & Elec Cbl Rmvl, FRSA	423	423	0	0	0	0	0	0	0	0	0	0	0
5508	CP-011 Demolition @FRSA	237	237	0	0	0	0	0	0	0	0	0	0	0
5514	CP-012 Marine & On-Shore Fac FRSA	5,614	5,614	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$13,240	$13,240	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SQUANTUM POINT														
5631	CP-005 Dredging at Squantum Point	$332	$332	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5598	CP-013 Per Ferry @Squantum Pt Pk	1,642	1,642	(0)	0	0	0	0	0	0	0	0	0	(0)
5634	CP-014 Upland Fclty @Squantum Pt	1,835	1,835	0	0	0	0	0	0	0	0	0	0	0
	Project Total:	$3,809	$3,809	($0)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($0)
	Project Sub-total:	$17,049	$17,049	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBTOTAL: TREATMENT		$328,994	$316,801	$12,193	$0	$512	$0	$0	$512	$11,681	$0	$0	$0	($0)

WASTEWATER STATE REVOLVING LOAN FUND
RECEIPTS FORECAST FY 1998 - 2007
($000)

SOURCE:	STATE REVOLVING LOAN FUND PROJECT	Total Loan Amount	Projected Payments Thr. FY97	Remaining Balance 06/30/97	Jul-Sep 1997	Oct-Dec 1997	Jan-Mar 1998	Apr-Jun 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
D. CSO's														
6155	Sewer Separation/Fox Pt. BOS 088-089	$854	$271	$583	$271	$269	$0	$0	$540	$43	$0	$0	$0	($0)
6154	Sewer Separation/Com.Pt. BOS 090	1,017	323	694	323	321	0	0	644	51	0	0	0	(0)
6153	Sewer Separation/BOS 002	293	93	200	93	92	0	0	185	15	0	0	0	0
6156	Sewer Separation/BOS 093-095	639	203	436	203	201	0	0	404	32	0	0	0	0
6161	Sewer Separation/CAM 002-004	788	250	538	250	249	0	0	499	39	0	0	0	(0)
TBD	Stoney Br Hydro Relief/CAM005 BOS017	54	0	54	51	0	0	0	51	3	0	0	0	(0)
TBD	Chelsea Tr Branch Sew Rel/CHE008	61	0	61	58	0	0	0	58	3	0	0	0	0
TBD	N. Dor Bay Res. Ch Conduits & P.S.	191	0	191	182	0	0	0	182	10	0	0	0	0
6123	Upgrade CSO's/MWRA Float Control	743	506	237	181	19	0	0	200	37	0	0	0	0
SUBTOTAL: CSO's		$4,640	$1,646	$2,994	$1,611	$1,151	$0	$0	$2,762	$232	$0	$0	$0	$0
SRF GRAND TOTAL:		$384,506	$360,813	$23,693	$6,193	$4,129	$178	$0	$10,499	$13,193	$0	$0	$0	$1

WATERWORKS SYSTEM IMPROVEMENTS PROGRAM

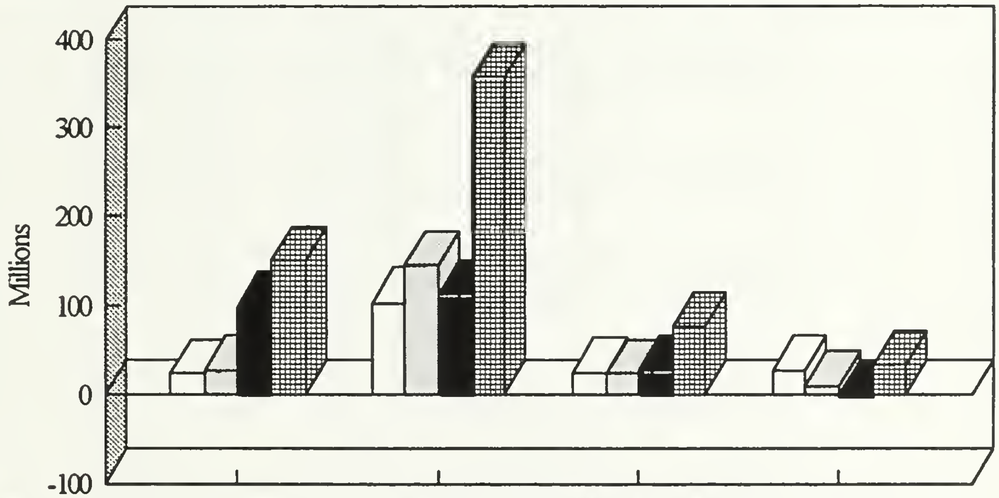
Program Summary

The proposed Waterworks System Improvements Program for FY98-00 includes expected outlays of $619.1 million in four program categories: Drinking Water Quality Improvements, Transmission, Distribution and Pumping , and Other. The chart and table below summarize the three-year projection of expenditures in each of these program areas.

An additional $852.8 million in expenditures is budgeted beyond FY00 to complete all projects.

Expenditures forecasts for individual capital projects in each program category follow this page.

Proposed FY98-00 Waterworks System Improvements Program and Budget
($000s)



Prgm Category	* DWQI	Transmission	Distribution & Pump	Other
□ FY98	$23,947	$103,292	$25,044	$27,531
□ FY99	27,357	143,730	24,113	9,934
■ FY00	98,475	111,279	27,707	(3,306)
▦ Total	$149,779	$358,301	$76,864	$34,159

* Drinking Water Quality Improvements

PROPOSED WATERWORKS SYSTEM IMPROVEMENTS PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998-2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
F. DRINKING WATER QUALITY IMPROVEMENTS:																
2101 WALNUT HILL WATER TREATMENT PLANT																
53293 5023 **Study 1**	CH2M Hill	Jan-88	Feb-89	$444	$444	$0					$0					$0
53294 5024 **Study 2**	CH2M Hill	Jul-90	Jun-99	2,448	2,413	35	11	12	12		35					0
AWWARF Study	Black & Veatch	Oct-96	Jun-99	200	54	146	18	18	18	18	72	74				0
Open Res. Qual. Study	TBS	Feb-98	Jan-00	867	0	867			72	108	180	434	253			0
53367 6118 **Crypto Inactivation Study**	SNWA	Nov-96	Oct-98	150	48	102	18	18	18	18	72	30				0
53364 6126 **Dist. Water Quality Study**	TBS	Jun-96	Sep-96	0	0	0					0					0
53304 5157 **Permit Fees**	DEP	Jul-93	Jun-98	36	8	28	7	7	7	7	28					0
53300 5997 **Technical Assistance**	Various	Jan-88	May-2005	18	18	0					0					0
Walnut Hill WTP:																0
53296 5042 **EIR/Concept. Des**	CDM	Nov-93	Sep-96	5,975	5,975	0					0					0
53301 5017 **Design/ESDC**	TBS	Oct-96	May-2005	23,460	4,920	18,540	1,476	1,476	1,476	1,476	5,904	5,906	2,530	1,143	1,143	1,914
Construction	TBS	Nov-99	May-2005	339,326	0	339,326					0		84,704	107,529	89,269	57,824
53371 6134 **Des Mgmt Supp**	TBS	Jan-97	Jan-99	2,853	684	2,169	342	342	343	343	1,370	799				0
CM/RI	TBS	May-98	May-2005	30,273	0	30,273					0	1,002	4,493	6,492	8,435	9,851
Water Qual. Dec. Support	TBS	Jul-97	Dec-98	500	0	500	62	63	75	100	300	200				0
53368 6120 **Equipment Prepurchase**	TBS	N/A	N/A	0												
Project Total:				$406,550	$14,564	$391,986	$1,934	$1,936	$2,021	$2,070	$7,961	$8,445	$91,980	$115,164	$98,847	$69,589

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2102 QUABBIN WATER TREATMENT PLANT																
53363 6043 **Design/CA/RI**	CH2M Hill	May-95	Jul-2000	$2,260	$541	$1,719	$113	$113	$113	$113	$452	$594	$621	$52		$0
Construction	TBS	Aug-98	Jul-2000	2,272	0	2,272					0	1,041	1,136	95		0
Land	TBS	Jun-97	Jul-98	52	0	52	52				52					0
DEP Permit Fee	DEP	Jul-96	Aug-98	5	5	0					0	0				0
Project Total:				$4,589	$546	$4,043	$165	$113	$113	$113	$504	$1,635	$1,757	$147	$0	$0
2104 WATERSHED PROTECTION																
53357 6144 **Holden/W. Boylston Swr**	MDC Watershed Mgmt	Jul-96	Jun-2000	$8,500	$2,000	$6,500	$750	$750	$750	$750	$3,000	$2,500	$1,000			$0
53356 6002 **Sudbury Resrvr Prot Stdy**	Comprehensive Envir.	Apr-95	Apr-97	101	101	0					0	0				0
Project Total:				$8,601	$2,101	$6,500	$750	$750	$750	$750	$3,000	$2,500	$1,000	$0	$0	$0
2105 NORUMBEGA COVERED STORAGE																
53297 5041 **Preliminary Design**	CDM	Sep-92	Mar-97	$1,728	$1,728	$0					$0					$0
53364 6057 **Design/CA/RI**	TBS	Dec-97	Aug-2004	7,577	0	7,577		115	346	346	807	1,383	1,383	961	961	2,082
Construction	TBS	Jul-2000	Aug-2004	96,183	0	96,183					0			23,084	23,084	50,015
53372 6145 **Land**	Various	Sep-98	Jan-2000	160	3	157					0	157				0
53365 6115 **Appraisal**	Various	Nov-95	Jul-98	25	14	11				11	11					0
Project Total:				$105,673	$1,745	$103,928	$0	$115	$346	$357	$818	$1,540	$1,383	$24,045	$24,045	$52,097
2106 NASH HILL COVERED STORAGE																
53302 5049 **Preliminary Design**	Weston & Sampson	Jan-93	Dec-94	$368	$368	$0					$0	$0				$0
53362 6007 **Design/CA/RI**	Montgomery Watson	Aug-95	Oct-99	$1,156	680	476	51	51	51	51	204	204	68			0
53370 6133 **Construction**	TBS	Nov-97	Oct-99	$12,852	0	12,852		1,071	1,606	1,607	4,284	6,426	2,142			0
Project Total:				$14,376	$1,048	$13,328	$51	$1,122	$1,657	$1,658	$4,488	$6,630	$2,210	$0	$0	$0

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2107 BLUE HILLS COVERED STORAGE																
68025 6139 **EIR/Prelim. Design**	TBS	Jul-97	Sep-99	$566	$0	$566	$61	$61	$61	$61	$244	$257	$65			$0
Final Design/CA/RI	TBS	May-2000	Mar-2005	2,872	0	2,872					0	0	80	470	470	1,852
Construction	TBS	Mar-2003	Mar-2005	22,968	0	22,968					0	0				22,968
DEP/Permit Fees	Various	Mar-2002	Feb-2003	4	0	4					0	0			4	0
Project Total:				**$26,410**	**$0**	**$26,410**	**$61**	**$61**	**$61**	**$61**	**$244**	**$257**	**$145**	**$470**	**$474**	**$24,820**
2108 BEAR HILL COVERED STORAGE																
Feasibility/EIR/PD	TBS	Jan-2004	Dec-2005	$516	$0	$516					$0	$0				$516
FD/CA/RI	TBS	Jan-2006	Dec-2011	516	0	516					0	0				516
Construction	TBS	Jan-2009	Dec-2011	4,129	0	4,129					0	0				4,129
Project Total:				**$5,161**	**$0**	**$5,161**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$5,161**
2109 FELLS COVERED STORAGE																
67711 5070 **Des/CS/RI -Fells Res**	Klein & Hoffman	May-92	May-99	$1,961	$1,387	$574	$75	$75	$75	$75	$300	$274				$0
67713 5088 **Const.-Fells Reserv**	TBS	Jan-97	May-99	16,024	3,316	12,708	1,758	1,758	1,358	1,758	6,632	6,076				0
67715 5130 **DEP Permit Fees**	DEP	Jan-93	Dec-94	4	4	0					0					0
Project Total:				**$17,989**	**$4,707**	**$13,282**	**$1,833**	**$1,833**	**$1,433**	**$1,833**	**$6,932**	**$6,350**	**$0**	**$0**	**$0**	**$0**
FINAL PAYMENTS & RELEASE OF RETAINAGE																
Interim Corrosion Control:																
53303 5068 **Design/CA/RI Wachusett**	CH2M Hill	Jul-93	Apr-97	$1,535	$1,535	$0					$0					$0
53360 6003 **ICC Const- Wachusett**	D & C Construction	Dec-94	Oct-96	6,418	6,418	0					0					0
53366 6116 **ICC Const - Northboro**	Various	Sep-96	Mar-97	120	120	0					0					0
53235 5004 **DEP Source Approval**	Town of Norwood			64	64	0					0	0				0
FINAL PAYMENTS: SUPPLY AND TREATMENT TOTAL				**$8,137**	**$8,137**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SUB TOTAL: DRINKING WATER QUALITY IMPROVEMENTS				**$597,486**	**$32,848**	**$564,638**	**$4,794**	**$5,930**	**$6,381**	**$6,842**	**$23,947**	**$27,357**	**$98,475**	**$139,826**	**$123,366**	**$151,667**

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G. TRANSMISSION:																
2201. METROWEST TUNNEL																
59794 5043 Study	Ander Nichols	Jun-84	Oct-89	$415	$415	$0					$0					$0
59796 5048 Cons. -Sud. Pipe Br	D&C	Nov-91	Jun-92	296	296	0					0					0
59795 5044 Design/EIR-Tunnel/ESDC	Sverdrup	Apr-92	Oct-2004	32,170	21,469	10,701	365	365	365	366	1,461	1,459	1,459	1,459	1,459	3,404
59798 6054 West. Tunnel Seg. - CP1	TBS	Mar-97	Aug-2002	156,042	3,510	152,532	4,831	4,831	5,804	5,804	21,270	39,379	39,379	32,815	16,445	3,244
60013 6055 Midd. Tunnel Seg - CP2	Shea, Traylor, Healy	Jun-96	Feb-2003	251,898	41,903	209,995	9,483	9,483	9,483	9,483	37,932	51,396	42,651	32,206	35,810	10,000
60015 6059 East. Tunnel Seg - CP3	TBS	Aug-97	Sep-2001	56,078	0	56,078	2,436	3,333	3,845	5,513	15,127	13,440	13,135	11,198	3,178	0
60016 6060 Surface Work - CP 4	TBS	Apr-2000	Nov-2001	1,821	0	1,821					0		245	761	815	0
60014 6056 MHD Salt Sheds - CP5	TBS	Sep-96	Aug-97	1,292	1,077	215	215				215					0
Hultman Int/Insp - CP6	TBS	Jun-2004	Jul-2005	13,833	0	13,833					0					13,833
Test. & Disenfect - CP7	TBS	Mar-2003	Oct-2003	1,019	0	1,019					0					1,019
Weston Tanks - CP8	TBS	Sep-97	Oct-99	52,347	0	52,347		2,137	6,409	6,410	14,956	29,913	7,478			0
59799 5284 Construction Mgt/RI	Stone & Webster	Apr-95	Oct-2004	31,593	4,759	26,834	915	915	915	915	3,660	3,659	3,659	3,659	3,659	8,538
59806 5141 Hultman Study	Simpson Gumpertz et	Apr-95	Feb-2006	1,079	651	428	15	15	15	15	60	50	50	50	45	173
60022 6128 Hultman Leak Repair	Various	Aug-96	Dec-96	260	260	0					0					0
60026 6140 Hultman Repair Band	Verious	Aug-96	Sep-96	24	24	0					0					0
59805 5139 Land Acq.	Various	Oct-95	Jun-2005	6,295	3,422	2,873	191	191	190	191	763	766				1,344
59804 5976 Technical Assistance	Verious	Jun-84	Feb-2006	71	71	0					0					0
60012 6037 DEP Permit Fees	DEP	Oct-94	Aug-97	45	42	3	3				3					0
60020 6117 Professional Services	Various	Nov-95	Jun-99	500	220	280	35	35	35	35	140	140				0
60023 6129 Framingham MOU	Various	Apr-96	Jun-2003	2,547	948	1,599	116	116	117	116	465	346	175	170	204	239
60017 6063 Loc Sup Cont Des/CA/RI	Ander Nichols	May-96	Jun-98	740	412	328	62	82	82	82	328					0
60024 6130 Loc Sup Cont Constr	TBS	Apr-97	Jun-98	4,266	853	3,413	853	853	853	854	3,413					0
60025 6131 Loc Sup Cont Legal/Eeseme	TBS	May-96	Jun-98	82	16	66	16	16	17	17	66					0
60018 6067 Community Tech. Asst.	MAPC	Jun-95	Apr-98	395	255	140	42	42	42	14	140					0
60021 6122 Owner Controlled Insurance	Johnson, Higgins, et. a	Jun-96	Oct-2004	19,741	2,467	17,274	617	617	617	616	2,467	2,967	2,917	2,917	2,003	4,003
Project Total:				**$634,849**	**$83,070**	**$551,779**	**$20,215**	**$23,031**	**$28,789**	**$30,431**	**$102,466**	**$143,515**	**$111,148**	**$85,235**	**$63,618**	**$45,797**
2202. DAM CONTROL VALVE REPLACEMENT																
59732 5037 Constr Wachusett	Walsh	Dec-93	Feb-95	$1,072	$1,072	$0					$0	$0				$0
59733 6047 Constr - Sud. Reserv.	TBS	Jul-97	Feb-98	770	0	770	289	289	192		770	0				0
Project Total:				**$1,842**	**$1,072**	**$770**	**$289**	**$289**	**$192**	**$0**	**$770**	**$0**	**$0**	**$0**	**$0**	**$0**

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2203. SLUICE GATE REHABILITATION																
59757 5255 **Design/CS/RI**	SEA	Aug-88	Jul-93	$178	$178	$0					$0					$0
59758 5256 **Construction 1**	Walsh Const	Apr-91	Jul-93	1,529	1,529	0					0					0
Design/CS/RI 2	TBS	Jun-98	Nov-2003	490	0	490				5	5	54	54	54	54	269
59760 5258 **Construction 2**	TBS	Sep-2002	Nov-2003	3,359	0	3,359					0				0	3,359
59761 5259 **Constr. -Stop Planks**	Precise Fab	Dec-88	Jun-89	444	444	0					0					0
60027 6158 **Con Sudbury Toe Drain Repa**	MDC	Sep-96	Jun-97	1,800	1,800	0					0					0
Project Total:				**$7,800**	**$3,951**	**$3,849**	**$0**	**$0**	**$0**	**$5**	**$5**	**$54**	**$54**	**$54**	**$54**	**$3,628**
2204. METROPOLITAN TUNNEL LOOP																
Feasibility Study	TBS	Jun-98	Dec-99	$208	$0	$208				$11	$11	$131	$66			$0
Project Total:				**$208**	**$0**	**$208**	**$0**	**$0**	**$0**	**$11**	**$11**	**$131**	**$66**	**$0**	**$0**	**$0**
2206. CHICOPEE VALLEY AQUEDUCT INTERCONNECTIONS																
Design/CA/RI	TBS	Jul-2000	Oct-2004	$924	$0	$924					$0	$0		$175	$174	$575
Construction	TBS	Jan-2003	Oct-2004	3,029	0	3,029					0	0				3,029
Project Total:				**$3,953**	**$0**	**$3,953**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$175**	**$174**	**$3,604**
2207. WINSOR DAM HYDROELECTRIC																
Preliminary Permit Studies	TBS	Sep-97	May-98	$40	$0	$40	$5	$13	$13	$9	$40	$0				$0
Licensing & Detail Design	TBS	Aug-98	Oct-99	41	0	41					0	30	11			0
Project Total:				**$81**	**$0**	**$81**	**$5**	**$13**	**$13**	**$9**	**$40**	**$30**	**$11**	**$0**	**$0**	**$0**

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FINAL PAYMENTS & RELEASE OF RETAINAGE																
59744 5231 Inspection - Valve				$0	$0	$0					$0					$0
59747 5045 Construction - Valves	TBS			0	0	0					0					0
59782 5281 Tran Maint Dsg/CS	Barrientos			582	582	0					0					0
59783 5282 Tran Maint/Const.	SAE Americon			4,262	4,262	0					0					0
80011 8020 Tran Maint/HVAC	TBS			242	242	0					0					0
59785 5998 Technical Assistance	Various			26	26	0					0					0
59965 5288 Weston Chlo/Dsn/CS	Hayden Wegman			279	279	0					0					0
59966 5287 Weston Chlo/Const.	Wes Construct.			2,363	2,363	0					0					0
FINAL PAYMENTS TRANSMISSION TOTAL:				$7,754	$7,754	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL: TRANSMISSION				$656,487	$95,847	$560,640	$20,509	$23,333	$28,994	$30,456	$103,292	$143,730	$111,279	$85,464	$63,846	$53,029

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H. DISTRIBUTION AND PUMPING:																
2302 VALVE REPLACEMENT																
Contractor Work:																
67559 5126 **Construction 1**	Umbro & Sons	Nov-95	Nov-96	$731	$731	$0					$0	$0				$0
68102 6105 **Construction Phase 2**	TBS	Oct-97	Jul-98	1,610	0	1,610		483	483	483	1,449	161				0
Const. Phase 3-5	TBS	Aug-99	May-2004	4,905	0	4,905					0	0	1,635		1,635	1,635
In-House Work:																
68018 6111 **Equip Purchase FY97-06**	Various	Jul-96	Jun-2006	4,527	395	4,132	113	113	113	113	452	460	460	460	460	1,840
68005 6088 **Linestops FY96**	Various	Oct-95	Jun-96	17	17	0					0	0				0
68006 6089 **Main Line Valves**	TBS	N/A	N/A	0	0	0										
67560 5124 **Technical Assistance**	Various	Oct-95	Jun-2006	2	2	0					0	0				0
Project Total:				**$11,792**	**$1,145**	**$10,647**	**$113**	**$596**	**$596**	**$596**	**$1,901**	**$621**	**$2,095**	**$460**	**$2,095**	**$3,475**
2303 CATHODIC PROTECTION OF DISTRIBUTION MAINS																
68002 6058 **Planning Phase 1**	Contract Employee	Apr-95	Jun-97	$113	$113	$0					$0	$0				$0
68013 6106 **Planning Phase 2**	TBS	Jul-98	Jun-2000	102	0	102					0	51	51			0
Project Total:				**$215**	**$113**	**$102**	**$0**	**$0**	**$0**	**$0**	**$0**	**$51**	**$51**	**$0**	**$0**	**$0**
2305 BOSTON LOW SERVICE PIPE AND VALVE REHABILITATION																
67570 5120 **Study - Pipe**	Black & Veatch	Sep-84	Feb-91	$297	$297	$0					$0	$0				$0
67571 5122 **Design/CS**	Black & Veatch	Jul-92	Apr-2007	964	508	456	18	18	18	18	72	71	59			254
67575 5135 **Resident Inspection**	TBS	Apr-98	Apr-2007	2,022	0	2,022				121	121	486	404			1,011
67572 5123 **Phs 1 Equip Prepurchase**	Various	Feb-95	Dec-95	892	892	0					0	0				0
68000 6045 **Const Clinton&Boylston St**	TBS	Apr-98	Apr-2000	4,800	0	4,800				576	576	2,304	1,920			0
67999 6044 **Const Beacon St**	TBS	Apr-2005	Apr-2007	13,613	0	13,613					0	0				13,613
Project Total:				**$22,588**	**$1,697**	**$20,891**	**$18**	**$18**	**$18**	**$715**	**$769**	**$2,861**	**$2,383**	**$0**	**$0**	**$14,878**
2306 REHABILITATION OF WESTON AQUEDUCT SUPPLY MAIN (WASM) 1 & 2																
68027 6142 **Design/CA/RI**	TBS	Aug-97	Feb-2008	$6,049	$0	$6,049	$137	$205	$205	$182	$729	$539	$643	$1,036	$865	$2,237
Construction Contract 1	TBS	Dec-99	Jan-2001	12,416	0	12,416					0		6,208	6,208		0
Construction Contract 2	TBS	Dec-2000	Dec-2001	3,789	0	3,789					0			2,040	1,749	0
Construction Contract 3	TBS	Oct-2005	Feb-2008	12,755	0	12,755					0					12,755
Easements Contract 1	TBS	Jul-99	Jun-2000	52	0	52					0		52			0
Easements Contract 2	TBS	Jul-2000	Jun-2001	15	0	15					0			15		0
Easements Contract 3	TBS	Jul-2005	Jun-2006	56	0	56					0					56
Project Total:				**$35,132**	**$0**	**$35,132**	**$137**	**$205**	**$205**	**$182**	**$729**	**$539**	**$6,903**	**$9,299**	**$2,614**	**$15,048**

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2307 NONANTUM ROAD PIPE REHABILITATION																
67589 5208 Construction	P. Caliaco Corp	Mar-96	Mar-97	$1,939	$1,939	$0					$0	$0				$0
68029 6149 Equipment Purchase	Various	Jan-91	Dec-92	$157	157	0					0	0				0
67590 5979 Technical Assistance	Various	Jan-91	Mar-97	15	15	0					0	0				0
Project Total:				**$2,111**	**$2,111**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
2309 WARREN COTTAGE LINE REHABILITATION																
Construction	TBS	Aug-2000	Jul-2001	$1,507	$0	$1,507					$0	$0		$1,381	$126	$0
Easements	TBS	Jul-2000	Jun-2001	12	0	12					0	0		12		0
Project Total:				**$1,519**	**$0**	**$1,519**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1,393**	**$126**	**$0**
2310 SOUTHERN SERVICE IMPROVEMENTS																
67612 5119 Des/CS/RI - H.P. Ave.	Black & Veatch	Jul-91	Aug-2000	$1,317	$397	$920	$40	$40	$39	$39	$158	$298	$398	$66		$0
67602 5125 Design HP Ave - Yd Pipe	Whitman&Howard	Apr-82	Oct-83	81	81	0					0					0
67606 5190 C1 - HP Yard Piping	TBS	N/A	N/A	0	0	0					0	0				0
68024 6138 Con-HP Pipeline	TBS	Dec-98	Aug-2000	3,707	0	3,707					0	1,239	2,124	344		0
Eas/Landl HP Pipeline	TBS	Jul-98	Nov-98	28	0	28					0	28				0
68034 6195 HP Permit/Road	TBS	Oct-96	Nov-96	10	10	0					0					0
67604 5187 Des/CS/RI - Newt PS	Fay,Spof,Thorn	Feb-88	Oct-97	549	500	49	37	12			49	0				0
67607 5195 Const. Newt PS -Ph 1	WES Const.	May-90	Jul-91	190	190	0					0	0				0
67608 5101 Const. Newt PS -Ph 2	Barletta Eng Corp	May-95	Oct-97	3,090	2,463	627	419	208			627	0				0
67605 5189 Des/CS/RI - 94,95,96	Black & Veatch	Jul-88	Jun-93	709	709	0					0	0				0
67611 5205 Const. - Sec. 96	Zenone Inc.	Oct-91	Jun-93	2,025	2,025	0					0	0				0
67609 5198 Const. - Sec. 94	Methuen Const.	May-91	Mar-92	1,569	1,569	0					0	0				0
67615 5121 Boston Paving	City of Boston			456	456	0					0	0				0
67613 5981 Technical Assistance	Various	Jul-90	Aug-00	31	31	0					0	0				0
Project Total:				**$13,762**	**$8,431**	**$5,331**	**$496**	**$260**	**$39**	**$39**	**$834**	**$1,565**	**$2,522**	**$410**	**$0**	**$0**

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2311 HEATH HILL RD PIPE REPLACEMENT																
67639 5192 **Des/CS/RI- Sec. 52 Phs1**	Black & Veatch	May-89	Apr-92	$209	$209	$0					$0					$0
Des/CS/RI- Sec. 52 Phs2	TBS	Dec-97	Mar-2003	1,302	0	1,302		13	39	39	91	153	153	153	365	387
67645 6042 **Const. - Sect. 52 New**	Albanese Brothers	Apr-96	Feb-98	625	374	251	94	94	63		251					0
67642 5194 **Const. - Sect. 52 Rehab**	TBS	Dec-2001	Mar-2003	6,137	0	6,137					0				2,685	3,452
67640 5206 **Des/CS/RI- Sec 58,20**	Weston Sampson	Jan-91	Dec-98	1,170	640	530	88	88	88	88	352	178				0
67643 5102 **Const. - Sect. 58,20**	TBS	Apr-97	Dec-98	4,291	613	3,678	613	613	613	613	2,452	1,226				0
67644 5985 **Technical Assistance**	Various	May-89	Mar-2003	7	7	0					0					0
68008 6100 **Legal/Easements New**	Various	Jan-95	Dec-95	16	16	0					0					0
Legal/Easements Rehab	TBS	Dec-2000	Nov-2001	26	0	26					0				26	0
Project Total:				**$13,783**	**$1,859**	**$11,924**	**$795**	**$808**	**$803**	**$740**	**$3,146**	**$1,557**	**$153**	**$153**	**$3,078**	**$3,839**
2312 SOUTHERN SPINE DISTRIBUTION MAINS																
Phase Sec 21, 43, & 22:																
Design/CS/RI	TBS	Nov-98	Nov-2004	$3,888	$0	$3,888					$0	$282	$423	$423	$423	$2,337
Easements	TBS	Jul-2002	Jun-2003	112	0	112					0				56	56
Construction	TBS	Mar-2003	Nov-2004	18,159	0	18,159					0					18,159
Phase Sec 19:																
Design/CS/RI	TBS	Nov-2001	Nov-2007	$1,218	0	1,218					0				$88	1,130
Easements	TBS	Jul-2005	Jun-2006	27	0	27					0					27
Construction	TBS	Mar-2006	Nov-2007	5,744	0	5,744					0					5,744
Phase Sec 20 & 58:																
Design/CS/RI	TBS	Nov-2003	Nov-2009	1,254	0	1,254					0					1,254
Easements	TBS	Jul-2007	Jun-2008	43	0	43					0					43
Construction	TBS	Mar-2008	Nov-2009	5,911	0	5,911					0					5,911
Project Total:				**$36,356**	**$0**	**$36,356**	**$0**	**$0**	**$0**	**$0**	**$0**	**$282**	**$423**	**$423**	**$567**	**$34,661**
2314 SOUTHERN EXTRA HIGH SECTION 41, 42, & 74																
68014 6107 **Design/CA/RI**	TBS	Mar-97	Feb-2002	$1,307	$56	$1,251	$42	$42	$42	$42	$168	$168	$168	$402	$345	$0
Easements	TBS	Jul-2000	Jun-2001	67	0	67					0	0	67			0
Construction	TBS	Nov-2000	Feb-2002	6,379	0	6,379					0	0		3,189	3,190	0
Project Total:				**$7,753**	**$56**	**$7,697**	**$42**	**$42**	**$42**	**$42**	**$168**	**$168**	**$235**	**$3,591**	**$3,535**	**$0**

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2315 CHESTNUT HILL CONNECTING MAINS																
68026 6141 Routing Study	TBS	Jan-98	Aug-98	$456	$0	$456			$171	$171	$342	$114				$0
Design/CA/RI	TBS	Jan-2000	Jan-2006	1,821	0	1,821					0		95	191	191	1,344
Construction	TBS	Jul-2004	Jan-2006	8,749	0	8,749					0					8,749
Easements	TBS	Jul-2003	Jun-2004	37	0	37					0					37
Project Total:				$11,063	$0	$11,063	$0	$0	$171	$171	$342	$114	$95	$191	$191	$10,130
2317 NEWTON SERVICE IMPROVEMENTS																
68015 6108 Construction Sec 95 & 100	TBS	Jul-97	May-99	$7,360	$0	$7,360	$1,000	$1,000	$840	$1,000	$3,840	$3,520				$0
68016 6109 Easement Sec 95 & 100	TBS	Jul-96	Jun-97	67	67	0					0					0
67910 5164 Technical Assistance	TBS	Oct-93	May-99	8	8	0					0					0
68009 6101 Tree Replacement	City of Brookline	Oct-95	Dec-95	7	7	0					0					0
Project Total:				$7,442	$82	$7,360	$1,000	$1,000	$840	$1,000	$3,840	$3,520	$0	$0	$0	$0
2318 COMMONWEALTH AVENUE PUMP STATION MODERNIZATION																
67649 5079 Prel.Design	Fay,Spof,Thorn	Feb-88	Aug-89	$118	$118	$0					$0					$0
67652 5084 Fl.Design/CS/RI	Black & Veatch	May-92	Jun-99	1,622	955	667	83	83	84	84	334	333				0
67650 5080 Constr. - Ph 1	WES Const.	May-90	Jul-91	63	63	0					0					0
67651 6132 Constr. - Ph 2	TBS	Jun-97	Jun-99	4,885	196	4,689	586	586	586	586	2,344	2,345				0
68022 6127 PCB Abatement	Real Prop&Env Mgmt	Apr-96	Jun-97	50	50	0					0					0
67983 6023 Land	Various	Jul-95	Sep-98	19	19	0					0					0
67985 6025 DEP Fees	DEP	Apr-95	Jun-96	3	3	0					0					0
68003 6064 Appraisal	Various	Jul-94	Dec-96	3	3	0					0					0
67979 6004 Technical Assistance	Various	Feb-88	Jun-99	22	22	0					0					0
Project Total:				$6,785	$1,429	$5,356	$669	$669	$670	$670	$2,678	$2,678	$0	$0	$0	$0

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2319 LEXINGTON STREET PUMP STATION REHABILITATION																
67677 5081 Design/CS/RI	Fay,Spof,Thorn	Feb-88	Oct-97	$582	$514	$68	$50	$18			$68	$0				$0
67678 5082 Constr. - Ph 1	WES Const.	May-90	Jul-91	166	166	0					0	0				0
67680 5083 Constr. - MDPW	Mass DPW	Jul-90	Jul-91	308	308	0					0	0				0
67679 5127 Constr. - Ph 2	Barletta Eng Corp	May-95	Oct-97	2,282	1,820	462	334	128			462	0				0
67984 6024 Land	TBS	Jul-94	Sep-95	6	6	0					0	0				0
Project Total:				$3,344	$2,814	$530	$384	$146	$0	$0	$530	$0	$0	$0	$0	$0
2320 REHABILITATION OF OTHER PUMPING STATIONS																
67885 5153 Preliminary design	Fay,Spof,Thorn	Aug-94	Mar-96	$401	$401	$0					$0					$0
68017 6110 Design/CS/RI	TBS	May-97	Nov-2002	1,555	35	1,520	53	53	53	53	212	210	210	333	391	164
Construction	TBS	Nov-2000	Nov-2002	7,943	0	7,943					0			2,542	3,813	1,588
Project Total:				$9,899	$436	$9,463	$53	$53	$53	$53	$212	$210	$210	$2,875	$4,204	$1,752
2321 BEAR HILL IMPROVEMENTS - SECTION 29 REHABILITATION																
Construction	TBS	Mar-2006	Jan-2007	$1,389	$0	$1,389					$0	$0				$1,389
Easements	TBS	Jul-2005	Jun-2006	14	0	14					0	0				14
Project Total:				$1,403	$0	$1,403	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,403

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2323 SPOT POND PUMP STATION REHABILITATION																
67701 5249 **Pump**	Gen.Electric	Aug-86	Aug-86	$70	$70	$0					$0	$0				$0
67702 5076 **Electrical Upgrade**	Richardson	May-84	Sep-87	200	200	0					0	0				0
67709 5074 **Const. - Diesel Ex.**	P.J. Kennedy	Apr-88	Dec-88	60	60	0					0	0				0
67703 5077 **Design/CS/RI - P.S.**	Fay,Spof,Thorn	Feb-88	Oct-97	2,150	1,859	291	218	73			291	0				0
67707 5078 **Const.- P.S.- Ph 1**	WES Const.	May-90	Jul-91	630	630	0					0	0				0
67708 5051 **Const.- P.S.- Ph 2**	Barletta Eng Corp	May-95	Oct-97	10,986	10,117	869	651	218			869	0				0
67708 5240 **Spot Pond PS Eng. 29**	Wes Construction	Jul-94	Jul-95	273	273	0					0	0				0
67998 6038 **Hydraulic Trmt. Analysis**	Beta Engineering	Apr-95	Sep-95	61	61	0					0	0				0
67716 5047 **Oil Control Plan**	P.R. Johnson	Aug-92	Dec-92	171	171	0					0	0				0
67717 5050 **Drain Line Cleaning**	H.L. Smith, Inc	Nov-92	Jan-93	268	268	0					0	0				0
67704 5072 **Des/CS/RI-Suct Pipe**	Weston Sampson	Jul-90	Apr-98	1,388	1,173	215	64	64	64	23	215	0				0
67705 5071 **Study -Suction Pipe**	Weston Sampson	Nov-89	Nov-90	476	476	0					0	0				0
67706 5073 **Const.-Suction Pipe**	Gioioso and Sons	Oct-95	Apr-98	10,710	8,050	2,660	798	798	798	266	2,660	0				0
Tudor Barn	TBS			125	0	125	125				125					0
67994 6030 **Paving-Highland Ave**	City of Malden	Oct-94	Nov-94	86	86	0					0	0				0
67720 5219 **Const-Rehab Discharge**	TBS	Sep-99	Dec-2000	1,530	0	1,530					0	270	760	500		0
67719 5144 **Const -Sewer P.S.**	Barletta Eng Corp	May-96	Dec-96	205	205	0					0					0
67714 5983 **Technical Assistance**	Various	May-84	Dec-2000	141	141	0					0					0
67718 5053 **Env Assess & Rem Plan**	Stone & Webster	Oct-94	Aug-98	350	225	125	27	27	27	27	108	17				0
Remedial Action Plan	TBS	Oct-98	Jul-98	1,674	0	1,674					0	685	913	76		0
Design-SP Const. Office	TBS	Jul-97	Oct-2000	200	0	200	10	10	11	11	42	42	83	33		
Constru-SP Const. Office	TBS	Oct-99	Oct-2000	1,021	0	1,021					0	0	707	314		
67991 6027 **DEP Review Fees**	DEP	Jul-94	Apr-99	10	4	6					0	6				0
Project Total:				$32,785	$24,069	$8,716	$1,893	$1,190	$900	$327	$4,310	$1,020	$2,463	$923	$0	$0
2324 WESTON AQUEDUCT AND SUPPLY MAIN (WASM) 4																
67865 5147 **Design/CA/RI**	CDM	Mar-95	Jan-2004	$5,196	$1,722	$3,474	$154	$154	$154	$154	$616	$736	$562	$459	$578	$523
Appraisal/Easement	TBS	Mar-95	Feb-2001	133	28	105	7	7	7	6	27	26	26	26		0
Construction Contract 1	TBS	Feb-2001	May-2002	1,761	0	1,761					0			$550	$1,211	0
Construction Contract 2	TBS	Jun-97	Nov-98	2,576	142	2,434	467	467	307	467	1,708	726				0
Construction Contract 3	TBS	Dec-98	Dec-99	9,407	0	9,407					0	5,065	4,342			0
Construction Contract 4	TBS	Jan-2001	Jan-2004	17,015	0	17,015					0			$2,760	$5,518	8,737
Const - Meter 103	TBS	Oct-96	Oct-97	60	42	18	$14	$4			18					0
Const - Bridge Crossing	TBS	Feb-2001	Dec-2001	1,111	0	1,111					0			505	606	0
59774 5034 **Const. Newton Wtr Mains**	Walsh CO	Apr-95	Oct-96	699	699	0					0	0				0
59776 5975 **Technical Assistance**	Various	Mar-95	Jan-2004	103	103	0					0	0				0
Project Total:				$38,061	$2,736	$35,325	$642	$632	$468	$627	$2,369	$6,553	$4,930	$4,300	$7,913	$9,260

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2325 SPOT POND SUPPLY MAINS - REHABILITATION																
Preliminary Study	TBS	N/A	N/A	$0	$0	$0					$0					$0
Pre Des & Design/CA/RI	TBS	Jul-97	Dec-2008	8,976	0	8,976	92	92	92	92	368	368	622	877	877	5,864
Easements	TBS	Jul-2003	Jun-2004	203	0	203					0	0				203
Construction	TBS	May-2004	Dec-2008	43,047	0	43,047					0	0				43,047
Equipment Purch-Valve	TBS	N/A	N/A	0	0	0					0					0
Project Total:				$52,226	$0	$52,226	$92	$92	$92	$92	$368	$368	$622	$877	$877	$49,114
2326 NORTHERN LOW SERVICE PIPELINE REPLACEMENT																
87736 5199 Des/CS/RI-Medford Phs1	Black & Veatch	Aug-88	May-92	$221	$221	$0					$0	$0				$0
68019 6112 Des/CS/RI-Medford Phs2	TBS	Aug-98	Apr-2004	259	0	259					0	24	26	26	26	157
67739 5196 Constr. - Medford	TBS	Apr-2003	Apr-2004	1,343	0	1,343					0	0				1,343
Easements-Medford	TBS	Jul-2002	Jun-2003	4	0	4					0	0				4
Project Total:				$1,827	$221	$1,606	$0	$0	$0	$0	$0	$24	$26	$26	$26	$1,504
2327 WATER MAIN RELOCATION IN CHELSEA RIVER																
68023 6135 Planning/Design/CA/RI	TBS	Dec-96	Nov-2001	$730	$47	$683	$20	$20	$20	$20	$80	$81	$81	$226	$215	$0
Construction	TBS	Mar-2001	Nov-2001	4,322	0	4,322					0	0		1,928	2,394	0
Project Total:				$5,052	$47	$5,005	$20	$20	$20	$20	$80	$81	$81	$2,154	$2,609	$0
2328 NORTH LOW SERVICE- SECTION 8 & 57																
Section 8:																
Easements	TBS	Jul-2004	Jun-2005	$52	$0	$52					$0	$0				$52
Construction	TBS	Jul-2005	Mar-2007	7,100	0	7,100					0	0				7,100
Section 57:																
Easements	TBS	Jul-2002	Jun-2003	17	0	17					0	0				17
Construction	TBS	Jul-2003	Mar-2005	3,480	0	3,480					0	0				3,480
Project Total:				$10,649	$0	$10,649	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,649

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2329 NEW CONNECTING MAINS - SHAFT 7 TO WASM 3																
67992 6028 Construction 1-Watertown	City of Watertown	Jul-96	Sep-96	$167	$167	$0					$0	$0				$0
67846 5163 Routing Study	Weston & Sampson	Aug-94	Nov-96	408	408	0					0	0				0
68028 6143 Design/CA/RI 2	TBS	Dec-97	Jan-2007	7,709	0	7,709		63	189	190	442	758	758	758	758	4,235
Construction 2	TBS	Sep-2002	Jan-2007	37,441	0	37,441					0	0				37,441
Easements 2	TBS	Jul-2001	Jun-2002	213	0	213					0	0		106	107	0
Constr Intermediate High	TBS	Jan-2004	Mar-2006	1,702	0	1,702					0	0				1,702
Easements Intrmdt High	TBS	Jul-2002	Jan-2004	35	0	35					0	0				35
Project Total:				$47,675	$575	$47,100	$0	$63	$189	$190	$442	$758	$758	$864	$865	$43,413
2331 NORTHERN HIGH SERVICE - REPLACE SECTION 26																
67950 5203 Design/CA/RI	TBS	Aug-99	Sep-2004	$888	$76	$812					$0	$0	$124	$135	$139	$414
Easements	TBS	Jul-2001	Jun-2002	43	0	43					0	0			43	0
Construction	TBS	Jun-2002	Sep-2004	4,185	0	4,185					0	0			149	4,036
Project Total:				$5,116	$76	$5,040	$0	$0	$0	$0	$0	$0	$124	$135	$331	$4,450
2332 NORTHERN HIGH SERVICE- CONNECTING MAINS FROM SECTION 91																
67930 5165 Design/CA/RI	SEA	Jun-95	Oct-2002	$1,424	$390	$1,034	$27	$27	$27	$27	$108	$109	$177	$274	$274	$92
Easements	TBS	Jul-99	Jun-2000	40	0	40					0		40			0
Construction	TBS	Feb-2000	Oct-2002	5,972	0	5,972					0		905	2,172	2,172	723
Project Total:				$7,436	$390	$7,046	$27	$27	$27	$27	$108	$109	$1,122	$2,446	$2,446	$815
2333 NORTHERN HIGH SERVICE PIPE IMPROVEMENTS - LYNN PIPELINE																
67752 5113 Design 2 / CS/RI	LEA	Apr-88	Jul-98	$1,264	$1,242	$22	$5	$5	$5	$5	$20	$2				$0
67753 5114 Des/CS/RI-Haz. Mat.	GHR	Aug-88	Jul-98	370	265	105	24	24	24	25	97	8				0
67754 5115 Construction 2	J. Biotti	Jun-82	Aug-88	3,804	3,804	0					0	0				0
67755 5117 Construction 3	TBS	Aug-97	Jul-98	2,162	0	2,162	360	591	440	591	1,982	180				0
67756 5116 Construction 4	J. D'Amico	Dec-89	Apr-91	1,746	1,746	0					0	0				0
67758 5111 Gas Main -Wash. St.	Boston Gas	Apr-88	Oct-89	98	98	0					0	0				0
67759 5112 Traf Sys -Wash. St.	City of Lynn	Apr-88	Oct-89	15	15	0					0	0				0
67757 5118 Construction 5	Gioloso & Sons	Jul-91	Jul-94	4,384	4,384	0					0	0				0
67760 5995 Technical Assistance	Various	Jun-82	Jul-98	170	170	0					0	0				0
Project Total:				$14,013	$11,724	$2,289	$389	$620	$469	$621	$2,099	$190	$0	$0	$0	$0

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PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
2334 NORTHERN HIGH SERVICE - SECTION 27 IMPROVEMENTS																
67767 5146 **Borings - Sect. 27**	TBS	Jan-98	Mar-98	$9	$0	$9			$9		$9	$0				$0
67769 **Constr. - Sect. 27**	TBS	Sep-2000	Feb-2002	2,805	0	2,805					0	0		1,558	1,247	0
Project Total:				$2,814	$0	$2,814	$0	$0	$9	$0	$9	$0	$0	$1,558	$1,247	$0
2335 NORTHERN HIGH SERVICE- REVERE & MALDEN PIPELINE IMPROVEMENTS																
67780 5185 **Des/CS/RI- Rev/Mald**	Black & Veatch	May-88	Sep-94	$1,668	$1,668	$0					$0	$0				$0
67781 5186 **Constr. - Revere Bch**	Gioioso & Sons	Aug-92	Oct-94	6,319	6,319	0					0	0				0
67782 5176 **Constr. - Malden 53**	Albanese Bros.	Apr-92	Sep-94	10,043	10,043	0					0	0				0
68020 6113 **Landscape Mal Sec 53**	TBS	Apr-96	Jun-96	20	20	0					0	0				0
67794 5175 **Const. Asst. - Malden**	City of Malden	Sep-91	Jun-96	80	80	0					0	0				0
67792 5238 **Constr. - Linden Sqre**	Mass. DPW	Apr-91	Sep-96	1,854	1,854	0					0	0				0
67793 5239 **C.A. - Linden Sqre**	City of Malden	Apr-91	Nov-91	110	110	0					0	0				0
67784 5177 **Constr. - Revere 53**	TBS	Jun-2000	Jun-2001	3,041	0	3,041					0	0	234	2,807		0
Easements Revere 53	TBS	Jul-99	Jun-2000	22	0	22					0	0	22			0
67996 6033 **Des/CA/RI-Rd Restoration**	Greeman Pedersen, Inc	Nov-94	Dec-95	129	129	0					0	0				0
67997 6034 **Construct-Rd Restoration**	Albanese Brothers	Jun-95	Jun-96	1,703	1,703	0					0	0				0
68033 6183 **Sidewalk Restorations**		Sep-96	Oct-96	54	54	0					0	0				0
67785 5191 **Constr. - C. Valves**	DER	Jun-88	Aug-89	949	949	0					0	0				0
67786 5179 **Constr - DI Pipe C&L**	Spiniello	Jun-90	Sep-90	158	158	0					0	0				0
67787 5178 **Constr. - Win. C+L**	Spiniello	Jun-90	Aug-90	575	575	0					0	0				0
67790 **Constr. - 68 & 53A**	TBS	Jun-2002	Jun-2003	3,705	0	3,705					0	0			285	3,420
67791 5986 **Technical Assistance**	Various	May-88	Jun-2003	183	183	0					0	0				0
Project Total:				$30,613	$23,845	$6,768	$0	$0	$0	$0	$0	$0	$256	$2,807	$285	$3,420

PROPOSED WATERWORKS SYSTEM IMPROVEMENTS PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998-2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
2336 NORTHERN HIGH SERVICE PIPELINE REHABILITATION																
Design/CA/RI	TBS	Oct-2000	Dec-2009	$2,436	$0	$2,436					$0	$0		$199	$265	$1,972
Appraisal/Easement	TBS	Jul-2004	Jun-2005	130	0	130					0	0				130
Construction	TBS	Feb-2005	Dec-2009	11,467	0	11,467					0	0				11,467
Project Total:				$14,033	$0	$14,033	$0	$0	$0	$0	$0	$0	$0	$199	$265	$13,569
2337 NORTHERN EXTRA HIGH SERVICE NEW PIPELINES																
67970 5242 **Design/CA/RI**	Anderson Nichols	Sep-94	Jun-2000	$591	$221	$370	$9	$9	$9	$9	$36	$97	$237			$0
67971 **Appraisal/Easement**	TBS	Jul-98	Jun-99	22	0	22					0	22				0
Construction	TBS	Mar-99	Jun-2000	2,511	0	2,511					0	579	1,932			0
Constructio - Rehab		N/A	N/A	0	0	0					0	0	0			0
68010 6099 **Regulatory Compliance**	TBS	Nov-95	Jun-96	1	1	0					0	0				0
Project Total:				$3,125	$222	$2,903	$9	$9	$9	$9	$36	$698	$2,169	$0	$0	$0
2338 HYDRAULIC MODEL UPDATE																
Hydraulic Model Update	TBS	Jan-98	Jan-2000	$306	$0	$306			$37	$37	$74	$146	$86			$0
Project Total:				$306	$0	$306	$0	$0	$37	$37	$74	$146	$86	$0	$0	$0
SUB TOTAL: DISTRIBUTION AND PUMPING				$450,678	$84,078	$366,600	$6,779	$6,450	$5,657	$6,158	$25,044	$24,113	$27,707	$35,084	$33,272	$221,380

PROPOSED WATERWORKS SYSTEM IMPROVEMENTS PROGRAM
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($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
I. OTHER PROGRAMS:																
2401. CENTRAL MONITORING SYSTEM																
75300 5025 **Study**	O'Brien&Gere	Mar-84	Sep-86	$190	$190	$0					$0	$0				$0
75301 5026 **Design**	EMA	Oct-87	Mar-95	2,651	2,651	0					0	0				0
75304 5160 **Comm. Structures**	ESCOA	Nov-92	May-93	161	161	0					0	0				0
75305 5173 **Constr. Services**	SEA	Jul-92	Aug-98	721	521	200	43	43	43	43	172	28				0
75302 5027 **Equip. -Prepurchase**	Various	Oct-87	Dec-93	2,159	2,159	0					0	0				0
75306 5171 **Construction Bondsville**	TBS	Jul-97	Dec-98	973	209	764	127	127	127	127	508	256				0
75303 5028 **Res. Road & Const Meter**	Various	Aug-96	Aug-99	3,176	1,310	1,866	215	215	215	215	860	861	145			0
75474 6125 **Microwave Equipment**	Various	Mar-96	Mar-99	760	289	471	67	67	67	67	268	203				0
75308 5849 **Operations Center**	Mello Construct.	Sep-92	Jun-94	1,369	1,369	0					0	0				0
75309 5987 **Tech. Assistance**	Various	Jul-92	Aug-99	320	320	0					0	0				0
75310 5218 **Utility Installation**	TBS	Aug-96	Aug-99	29	8	21	2	2	2	2	8	10	3			0
Project Total:				$12,509	$9,187	$3,322	$454	$454	$454	$454	$1,816	$1,358	$148	$0	$0	$0
2402. REHABILITATION OF EXISTING FACILITIES																
75389 5213 **Constr. - Hyde Park**	Fidelity International	Jan-93	Oct-93	$397	$397	$0					$0	$0				$0
75391 5167 **Testing -Volumetric**	Built-Form	Apr-91	Jun-91	22	22	0					0	0				0
75396 5207 **Testing - Tracer**	In-House	Jan-91	Mar-91	19	19	0					0	0				0
75397 5159 **Subsurface Investig.**	Roy F. Weston	Jul-91	Jul-99	563	480	83	9	9	9	9	36	43	4			0
75392 5168 **Constr.- Tank Rem-Ph 1**	Franklin Environ Servic	Aug-92	Feb-94	183	183	0					0	0				0
75399 5214 **Constr.- Tank Rem-Ph 2**	Zenone, Inc.	Feb-95	Jul-95	98	98	0					0	0				0
75471 6032 **Constr.- Tank Rem-Ph 3**	D&C Construction Co.	Oct-95	Jul-96	33	33	0					0	0				0
75470 6006 **Constr.- Tank Replc**	TBS	May-97	Nov-97	1,434	410	1,024	615	409			1,024	0				0
75394 5210 **Constr Waltham Pipe**	TBS	Feb-2007	Sep-2007	193	0	193					0	0				193
75395 5211 **Constr Medford Pipe**	E.A. Colangeli	Aug-92	Jul-93	417	417	0					0	0				0
75400 5169 **Water Tank Inspection**	Robert L. Merithew	Oct-94	Nov-94	27	27	0					0	0				0
75398 5994 **Tech. Assistance**	Various	Jul-91	Sep-2007	16	16	0					0	0				0
75401 5136 **Constr.-Water Tank**	TBS	Jul-97	Jul-98	3,419	0	3,419	786	786	786	787	3,145	274				0
75402 5138 **Constr.-Stony Brook**	D'Allessandro Corp	Feb-95	Jul-96	268	268	0					0	0				0
75472 6070 **Fac Main Equip Pur FY96**	Various	Oct-95	Mar-96	57	57	0					0	0				0
75473 6114 **Fac Main Equip Pur FY97**	Various	Oct-96	Mar-98	500	250	250		125	125		250	0				0
75475 6151 **Fac. Maintenance Program**	Various	Jul-96	Jun-2000	4,000	1,000	3,000	250	250	250	250	1,000	1,000	1,000	0		0
Project Total:				$11,646	$3,677	$7,969	$1,660	$1,579	$1,170	$1,046	$5,455	$1,317	$1,004	$0	$0	$193

PROPOSED WATERWORKS SYSTEM IMPROVEMENTS PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998-2007
($000)

PROJECT	Project Participants	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
2403. DISTRIBUTION SYSTEMS FACILITIES MAPPING																
75458 5162 Planning/Design	CDM	Feb-95	Aug-99	$948	$387	$561	$65	$65	$65	$65	$260	$259	$42			$0
75476 6152 Data Purchase	Boston Edison	Aug-96	Nov-96	100	100	0					$0					0
Project Total:				**$1,048**	**$487**	**$561**	**$65**	**$65**	**$65**	**$65**	**$260**	**$259**	**$42**	**$0**	**$0**	**$0**
2404. LOCAL WATER INFRASTRUCTURE REHABILITATION ASSISTANCE PROGRAM																
Loans/Grants		Jul-97	Jun-99	$30,000	$0	$30,000	$5,000	$5,000	$5,000	$5,000	$20,000	$10,000	$0	$0	$0	$0
Loan Repayment		Jul-98	Jun-2004	(22,500)	0	(22,500)					0	(3,000)	(4,500)	(4,500)	(4,500)	(6,000)
Project Total:				**$7,500**	**$0**	**$7,500**	**$5,000**	**$5,000**	**$5,000**	**$5,000**	**$20,000**	**$7,000**	**($4,500)**	**($4,500)**	**($4,500)**	**($6,000)**
SUB TOTAL: OTHER PROGRAMS				**$32,703**	**$13,351**	**$19,352**	**$7,179**	**$7,098**	**$6,689**	**$6,665**	**$27,631**	**$9,934**	**($3,306)**	**($4,500)**	**($4,500)**	**($5,807)**
TOTAL WATERWORKS				**$1,737,354**	**$226,124**	**$1,511,230**	**$39,261**	**$42,811**	**$47,721**	**$50,021**	**$179,814**	**$205,134**	**$234,155**	**$255,874**	**$215,984**	**$420,269**

BUSINESS AND OPERATIONS SUPPORT PROGRAM

Program Summary

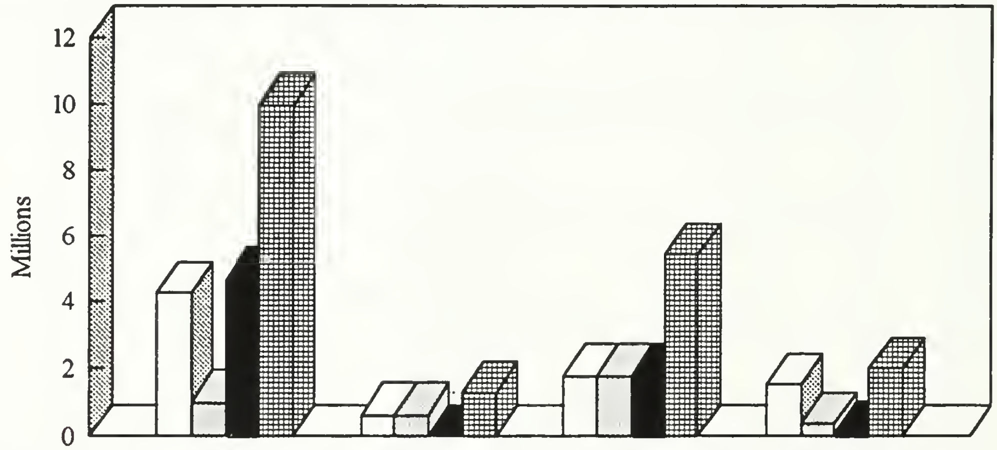
The proposed Business and Operations Support Program for FY98-00 includes projected outlays of $18.6 million for four projects: North Maintenance Facilities, Fore River Staging Area, Technical Assistance, and Business Systems Plan. The chart and table below summarizes the three-year projection of expenditures for each of these projects.

An additional $7.6 million in expenditures is budgeted beyond FY00 to complete all projects.

Expenditures forcasts for the individual projects follow this page. Also included in this section of the *Supplement* is the expenditure forecast for the MWRA's two Capital Budget Contingency Funds.

Proposed FY98-00 Business and Operations Support Program and Budget

($000s)



Prgm Category	North Maint Facs.	* FRSA	Tech Assistance	Business Syst. Plan
☐ FY98	$4,260	$642	$1,800	$1,526
☐ FY99	1,020	641	1,800	384
■ FY00	4,642	0	1,801	110
⊞ Total	$9,922	$1,283	$5,401	$2,020

* Fore River Staging Area

PROPOSED BUSINESS AND OPERATIONS SUPPORT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

PROJECT	Project Participant	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
J. BUSINESS AND OPERATIONS SUPPORT																
3101 NORTH MAINTENANCE FACILITY																
Chestnut Hill																
75438 5847 Design/CS/RI	TBS	Apr-90	Mar-99	$495	$495	$0					$0	$0				$0
75439 5848 Construction	TBS	delete		0	0	0					0	0				0
Distribution/Maintenance Facility																
92320 5886 Design/CS/RI	TBS	Jul-97	Aug-98	1,287	0	1,287					0	1,020	189	78		0
92321 5052 Land/Building	TBS	Jul-96	Mar-97	4,273	13	4,260	4,260				4,260	0				0
Construction	TBS	Jul-99	Jul-2000	6,439	0	6,439					0	0	3,863	2,576		0
Mystic Shops																
92324 6018 Design/CS/RI	TBS	Sep-98	Dec-99	333	0	333					0	0	192	70	71	0
Construction	TBS	Aug-2000	Oct-2001	1,914	0	1,914					0	0	0	1,000	914	0
Glenwood Yard																
92325 6019 Design/CS/RI	TBS	Sep-98	Dec-99	483	0	483					0	0	398	49	36	
Construction	TBS	Aug-2000	Oct-2001	2,775	0	2,775					0	0	0	1,400	1,375	0
Tech Asst	TBS			9	9	0					0	0				0
Project Total:				$18,008	$517	$17,491	$4,260	$0	$0	$0	$4,260	$1,020	$4,642	$5,173	$2,396	$0

PROPOSED BUSINESS AND OPERATIONS SUPPORT PROGRAM
CAPITAL EXPENDITURE FORECAST FY 1998 - 2007
($000)

	PROJECT	Project Participant	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
	3102 FORE RIVER STAGING AREA																
92147	5873 Cathodic Protection	TBS	Apr-91	Sep-94	$59	$59	$0					$0	$0				$0
92148	5874 Repair Elevators	TBS	Oct-88	Mar-89	6	6	0					0	0				0
92150	5877 Rehab Blds. 15 & 16	TBS	May-93	May-94	53	53	0					0	0				0
92151	5871 Rehab Bldg. 14	Various	Oct-91	Sep-93	164	164	0					0	0				0
92152	5593 FRSA Water Meter	Alewife	Nov-89	Feb-90	14	14	0					0	0				0
92153	5594 FRSA Repair Equip.	TBS	Jan-89	Apr-89	2	2	0					0	0				0
92154	5872 Back-Flow Preventers	TBS	Nov-89	Aug-90	10	10	0					0	0				0
92155	5878 PCB Transformer	Franklin	Nov-89	Apr-90	11	11	0					0	0				0
92157	5820 Water Tank Constr.	TBS	Aug-90	Jul-91	49	49	0					0	0				0
92158	5821 Fire Alarm Upgrade	TBS	Sep-93	Sep-94	103	103	0					0	0				0
92161	5884 Geological Storage	Various	Nov-89	Oct-90	23	23	0					0	0				0
92162	5949 Rectifier Install	TBS	Dec-90	Nov-91	9	9	0					0	0				0
92167	5870 Asbestos Removal	N American Site	Jul-95	Nov-95	299	299	(0)					0	0				0
92168	6001 Demolition - 86	TBS	Jul-94	Nov-94	143	143	0					0	0				0
	Drydock Pumps	TBS	Jul-96	Nov-97	416	416	0					0	0				0
	Geological Shelving	TBS	Nov-96	Nov-96	100	100	0					0	0				0
	Demolition	TBS	Jul-97	Jun-99	1,283	0	1,283	160	160	161	161	642	641				0
18536	5839 FRSA Upland Phase II - Des.	Pars/Brhoff/Qd/Do	Dec-93	Sep-94	670	670	0					0	0				0
18017	5731 FRSA Upland Phase II - Con	Westcott Con	Jul-95	Jul-96	4,183	4,183	0					0	0				0
92342	6173 Inspection Equipment	Cues, Inc.	Jul-96	May-97	183	183	0					0	0				0
25970	5684 Hazardous Waste	PEER	Dec-92	Jan-97	665	665	0					0	0				0
92169	6005 Embankment Improvments	P. Caliacco Corp.	Oct-96	Jun-97	84	84	0					0	0				0
92164	5929 Building 19 Rehab	Thomas O'Connor	Nov-94	Nov-95	2,334	2,334	0					0	0				0
92341	6035 ESDC - Bldg 19	SAR Engineering	Feb-95	Feb-96	40	40	0					0	0				0
92165	5992 Tech Asst - Bldg 19	various	Nov-94	Feb-96	266	266	0					0	0				0
	Project Total:				$11,169	$9,886	$1,283	$160	$160	$161	$161	$642	$641	$0	$0	$0	$0

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3103	TECHNICAL ASSISTANCE																
516TA	Sanitary	Anderson & Nichols	Mar-93	Mar-96	$150	$0	$150	$13	$13	$13	$13	$50	$50	$50			$0
TBA	Sanitary		Aug-96	Aug-99	150	0	150	13	13	13	13	50	50	50			0
517TA	Electrical/HVAC	R.D.Kimball	Mar-93	Sep-96	175	0	175	15	15	15	15	58	58	59			0
TBA	Electrical/HVAC		Aug-96	Aug-99	150	0	150	13	13	13	13	50	50	50			0
520TA	Mechanical	Beta	Nov-93	Nov-96	150	0	150	13	13	13	13	50	50	50			0
TBA	Mechanical				150	0	150	13	13	13	13	50	50	50			0
521TA	Structural	Beta	Nov-93	Nov-96	150	0	150	13	13	13	13	50	50	50			0
TBA	Structural				150	0	150	13	13	13	13	50	50	50			0
518TA	Material Testing	PSI Inc	Mar-93	Sep-96	150	0	150	13	13	13	13	50	50	50			0
TBA	Material Testing		Aug-96	Aug-99	150	0	150	13	13	13	13	50	50	50			0
522TA	Environmental Testing	TBA	Apr-94	Apr-97	300	0	300	25	25	25	25	100	100	100			0
523TA	Geotechnical	Garnett	Jun-92	Nov-96	150	0	150	13	13	13	13	50	50	50			0
535TA	Geotechnical	Garnett	Jan-96	Jan-99	150	0	150	13	13	13	13	50	50	50			0
TBA	Geotechnical				150	0	150	13	13	13	13	50	50	50			0
536TA	Surveying	HMM	Sep-95	Sep-98	200	0	200	17	17	17	17	67	67	66			0
511TA, 512TA	Hazardous Material	HMM	Dec-91	Nov-95	0	0	0	0	0	0	0	0	0				0
529TA & 530	Hazardous Material	TBA	Oct-95	Oct-98	900	0	900	75	75	75	75	300	300	300			0
TBA	Hazardous Material		Aug-96	Aug-99	0	0	0	0	0	0	0	0	0				0
532TA	Asbestos Removal	Peer	Jun-92	Oct-98	300	0	300	25	25	25	25	100	100	100			0
519TA & TBA	Architectural/Landscaping	Archetype	Jun-92	Aug-99	450	0	450	38	38	38	38	150	150	150			0
533TA	Architectural/Landscaping		Oct-95	Oct-98	150	0	150	13	13	13	13	50	50	50			0
515TA & 534	Instrument Control	Universal	May-92	Dec-98	150	0	150	13	13	13	13	50	50	50			0
509TA	Wetland/Environmental	Stone&Webster	Dec-91	Dec-94	0	0	0	0	0	0	0	0	0	0			0
531TA	Wetland/Permitting		Sep-95	Sep-98	150	0	150	13	13	13	13	50	50	50			0
525TA	Civil Engineer	Green Int'l	Oct-93	Oct-96	163	0	163	14	14	14	14	54	54	55			0
TBA	Civil Engineer				150	0	150	13	13	13	13	50	50	50			0
526TA	Cost Estimating	TBA	Jul-94	Jun-97	150	0	150	13	13	13	13	50	50	50			0
527TA,528TA	Land Appraisal	Foster/Ahern Assoc	Sep-94	ongoing	113	0	113	9	9	9	9	38	38	37			0
540TA,541TA	Land Appraisal	Phelan/Foster	Jan-97	Jan-99	100	0	100	8	8	8	8	33	33	34			0
5993	Energy	TBS	Jan-96	Jan-99	150	0	150	13	13	13	13	50	50	50			0
	Project Total:				$5,401	$0	$5,401	$450	$450	$450	$450	$1,800	$1,800	$1,801	$0	$0	$0

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PROJECT	Project Participant	Notice to Proceed	Substant. Complete	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	BEYOND FY2002
3104 BUSINESS SYSTEMS PLAN																
Phase I (FY95-97)	Various	Jul-94	Jun-97	$1,803	$1,803	$0					$0	$0				$0
Phase II (FY97-99)	Various	Jul-96	Jun-99	2,645	625	2,020	382	382	381	381	1,526	384	110			0
Phase III (FY99-01)	Various	Jul-98	Jun-01	0	0	0					0	0				0
90101 5933 Bldg 36 - Aux. Generator	Brite-Lite Electrical	Oct-94	Dec-95	229	229	0					0	0				0
Project Total:				$4,677	$2,657	$2,020	$382	$382	$381	$381	$1,526	$384	$110	$0	$0	$0
Sub-total: BUSINESS AND OPERATIONS SUPPORT				$39,255	$13,060	$26,195	$5,262	$992	$992	$992	$8,228	$3,846	$8,653	$6,173	$2,396	$0

CONTINGENCY FUND
EXPENDITURE FORECAST FY 1998 - 2007
($000)

	Total Contract Amount	Projected Payments Thr. FY97	Remaining Balance 6/30/97	JUL-SEP 1997	OCT-DEC 1997	JAN-MAR 1998	APR-JUN 1998	FY98	FY99	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007	Beyond FY2007
4001. CAPITAL BUDGET CONTINGENCY																		
Boston Harbor Project																		
FY98	$19,746	$0	$19,746	$4,937	$4,937	$4,937	$4,935	$19,746										
FY99	17,904	0	17,904						$17,904									
FY2000	6,340	0	6,340							$6,340								
FY2001	901	0	901								$901							
FY2002	0	0	0									$0						
FY2003	0	0	0										$0					
FY2004	0	0	0											$0				
FY2005	0	0	0												$0			
FY2006	0	0	0													$0		
FY2007	0	0	0														$0	
Total Harbor Contingency	**$44,891**	**$0**	**$44,891**	**$4,937**	**$4,937**	**$4,937**	**$4,935**	**$19,746**	**$17,904**	**$6,340**	**$901**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Other Authority Contingency																		
FY98	25,725	0	25,725	6,431	6,431	6,431	6,432	25,725										
FY99	31,506	0	31,506						31,506									
FY2000	38,471	0	38,471							38,471								
FY2001	47,849	0	47,849								47,849							
FY2002	36,140	0	36,140									36,140						
FY2003	21,470	0	21,470										21,470					
FY2004	14,341	0	14,341											14,341				
FY2005	10,893	0	10,893												10,893			
FY2006	6,451	0	6,451													6,451		
FY2007	4,592	0	4,592														4,592	0
Total Other Contingency	**$237,438**	**$0**	**$237,438**	**$6,431**	**$6,431**	**$6,431**	**$6,432**	**$25,725**	**$31,506**	**$38,471**	**$47,849**	**$36,140**	**$21,470**	**$14,341**	**$10,893**	**$6,451**	**$4,592**	**$0**
Total Authority Contingency	**$282,329**	**$0**	**$282,329**	**$11,368**	**$11,368**	**$11,368**	**$11,367**	**$45,471**	**$49,410**	**$44,811**	**$48,750**	**$36,140**	**$21,470**	**$14,341**	**$10,893**	**$6,451**	**$4,592**	**$0**